Contractors and Engineers Monthly

Vol. 38, No. 4 APRIL, 1941 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Water Works Construction**
  A feature of the construction of the substructure for the Chicago South District filtration plant was the excellent organization to meet a tight working schedule, with concreting carried out over a very wide area and but one point of entrance for materials and supplies. See page 2.
- **Hot Mix for State Road Work**
  Setting up one of his portable asphalt plants in a state-owned sand and gravel pit, a Virginia contractor produced 24,000 tons of hot-mix retread for several contracts in the vicinity, and then moved on. See page 11.
- **Maryland Paving Operations**
  The last of our series of articles on the relocation of U. S. 40 in Maryland, between Baltimore and the Delaware state line, compares the methods of concrete paving used by the six contractors who handled the work. See page 15.
- **Road Mix in Vermont**
  A road-mix surface of crushed-stone aggregate and cut-back asphalt was constructed on 6.576 miles of Vermont Route 15 last summer in record time and with minimum delays to traffic. See page 21.
- **Maintaining Gravel Roads**
  One of the maintenance problems of both state and county highway departments is the care of the many miles of gravel roads included in most highway systems. Maine has developed a successful program of treatment for the 5,000 miles of such roads in its state and state-aid highway system. See page 27.
- **Roadside Development**
  An interesting and worth-while roadside development project in Louisiana, for his work on which the contractor received Honorable Mention in CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for 1940, eliminated steep and badly eroded slopes and greatly improved the appearance of the roadside along 3.826 miles of U. S. 80. See page 33.

IN THIS ISSUE

A county trunk highway in Sheboygan County, Wis., built with an oil-stabilized base and black-top surface.

Stabilized Base For County Road

Sheboygan County, Wis., Improves Main Route with Oil-Stabilized Base and Asphaltic Mat

By A. C. DROPPERS, Sheboygan County, Wisconsin, Highway Commissioner

✦ THE successful use of an oil-stabilized base and asphaltic mat on a main county highway has been demonstrated by our experience in the development of a very important county trunk highway in Sheboygan County, Wis. Known

(*Concluded on page 35*)

Boulders Are Tough On Short Grade Job In New Hampshire

Frost Boil Control and a Multitude of Boulders Do Much to Complicate Work Of Forrest Constr. Co.

✦ THE contract for regrading and resurfacing by road mix 2.28 miles of U. S. 202 between Epsom and Chichester, N. H., one of the state's most heavily traveled routes, was awarded to the Forrest Construction Co., of Norwood, Mass., for the low bid of $56,344.25. A succession of muck holes that had bred frost boils with heaves as high as 12 inches had to be cleaned out and drained between beds of large boulders and ledge rock that required much block-hole work without a single heart-warming "big blast." The grading, other than frost-boil eradication, comprised slight changes of grade and one 1,000-foot line change.

Typical Work at East End

Only a few hundred yards from the east end of the contract a shallow side-hill cut struck ledge in the bottom with springs which poured water into the roadway rapidly. This section was marked for frost-boil eradication, as a silt pocket in this rock formation caused a 2-foot frost boil each winter. The grading comprised a 4-foot cut and the widening of the old roadway through large boulders. A hired Lorain 1½-yard shovel loaded to an 8-yard Autocar and an 8-yard Mack truck hauling the material to the fill as there was no wasted material on the job. A 4-foot layer of gravel-bottom base course was put in at the silt pocket and a 6-inch bituminous-coated perforated corrugated-metal underdrain was laid on each side of the road to remove the springs and prevent the water getting under the road.

Gravel Base Course

The borrow pit for the gravel-bottom base-course material was a ½-mile dead haul from the east end of the job. A-Lorain 40 loaded a fleet of three International trucks and one Dodge truck, owned by the contractor, and six hired trucks. The material was dumped on the road and spread immediately with an International T-35 tractor equipped with a Bucyrus-Erie bulldozer, and the final grade was spread with a Galion motor grader.

This gravel base course was all borrow and was spread in 12, 18 and 21-inch layers. The 12-inch course was used on good cuts and fills, the 18-inch for wet cuts and underdrains, and the 21-inch course in all ledge cuts. This type of insulation layer is being used more and more in states where gravel is not expensive. A few years ago when frost boils wrecked hundreds of miles of state highways in one midwest state and caused considerable damage in New England, there was not a single frost boil on a state highway in Massachusetts or Rhode Island, which had used the gravel base course or insulation course under all state highway construction for nearly two decades.

"One Decent Cut" on Job

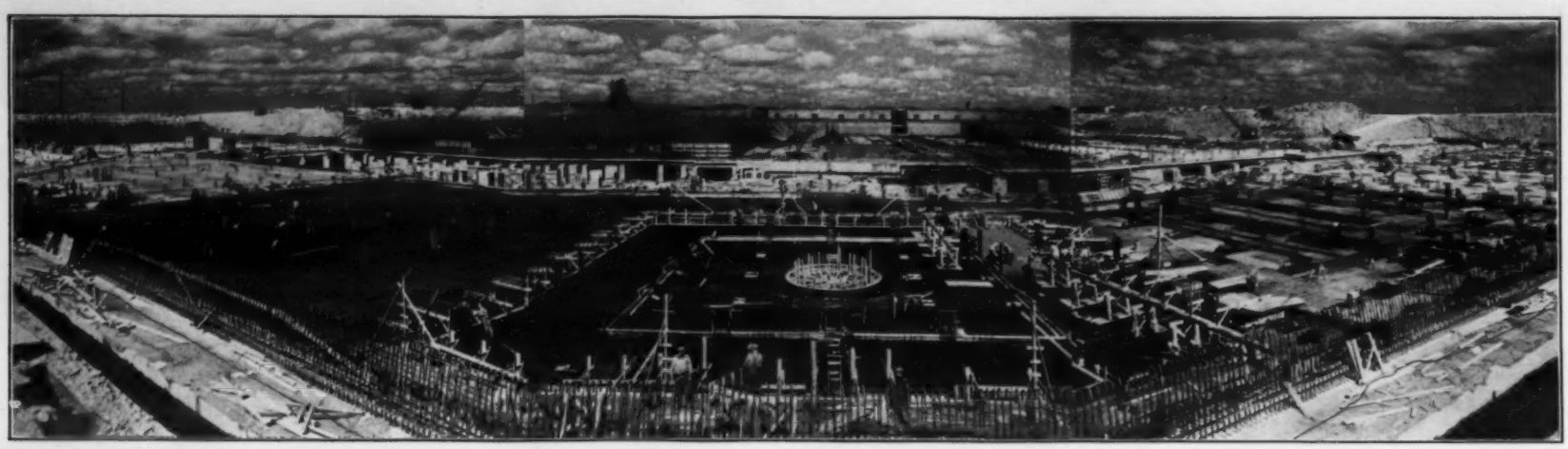
"There is only one decent cut on this job and that is only 156 cubic yards," said the Resident Engineer in discussing the program of work. On this cut the shovel could handle the good gravel readily, but everywhere else large and small boulders complicated the work.

As an example of the character of the ground, on one 9,000-yard cut of a mixture of earth and boulders, the excavation was carried to a depth of 6 feet with the road widened through a heavy boulder formation and ledge, but fortunately the ledge was of disintegrated granite which handled very easily with the Lorain 77 and saved the time which would have been required for drilling and blasting. All of the rock material

(*Concluded on page 10*)

SHASTA DAM FROM THE AIR

Many features of the construction plant for mighty Shasta Dam are shown in this Bureau of Reclamation view, looking upstream over the Sacramento River Canyon: (1) the concrete mixing plant alongside (2) the cableway head tower, 460 feet high, from which high lines stretch to seven tall towers, (3) one of which can be seen on its curved runway on the east side of the canyon; (4) a portion of Shasta Dam rising out of the excavation, block by block; (5) the power house under construction on the west bank of the river below the sloping penstock terraces; (6) the Vista House provided for visitors by the Bureau of Reclamation overlooks the whole scene.



Good Organization Speeds Concreting on Chicago Job

Michael Pontarelli & Sons Completed Substructure of New Filtration Plant in Record Time

(*Photo on page* 52)

✦ IN a sustained assault on Time and the elements, Michael Pontarelli & Sons, contractor of Chicago, Ill., achieved exceptional coordination and speed in completing its $6,000,000 contract for the substructure of Chicago's gigantic South District filtration plant well ahead of a tight schedule. The plant, a $20,000,000 project financed with PWA aid, is under construction in a cofferdam in Lake Michigan, off the foot of 78th Street.

In addition to the substructure described in this article, the project includes the superstructure, not yet advertised for bids; the cofferdam bulkhead enclosing the site; a 2,660-foot rubble mound breakwater constructed in 22 feet of water; fill for a 115-acre park and bathing beach; and 2 miles of 16-foot tunnels, all let on previous contracts.

Description of Job

The substructure is divided into two sections and was awarded under separate contracts. The first contract, including all excavation, was for the east section which is 850 feet long (east to west), 480 feet wide, and houses the intake basin, screen chamber, pump house, raw water basins, chemical mixing basins, flocculating basins and settling basins. The west, and adjoining, section is 650 feet, east to west, 900 feet wide and contains a battery of eighty 4-mgd filter beds and the outlet basins.

The immensity of the plant can best be illustrated by some of the quantities involved in its construction. The substructure alone contains 210,000 cubic yards of concrete placed in 5,200,000 square feet of forms, 22,000 tons of reinforcing steel, 70 tons of copper seals, 375 tons of miscellaneous steel framing, and some 830 tons of large wall castings for pipe and valve connections to be installed under a future contract. Many of these castings, weighing up to 4 tons each, were spotted in locations more or less inaccessible to cranes, because of surrounding forms, and presented quite a handling problem. In preparing the site, 485,000 cubic yards of combined sand, loam, clay and limestone was removed.

Although the substructure will be entirely under ground when completed, such items as backfill, waterproofing, etc., pass almost unnoticed in the face of more imposing activities. The waterproofing is of two types: damp-proofing on the outside walls below ground; and the rubbed chemical variety on the wet sides of all walls and slabs having both a wet and a dry side.

Stripping the lake bottom from bed rock inside the cofferdam was started on December 11, 1939, using one 2½-yard Northwest diesel power shovel and four 1½-yard Northwest gasoline units, eight Caterpillar D8's with 16-cubic yard Athey side-dump wagons, and from five to fifteen Sterling, Mack and International trucks, depending on the nature of the material to be hauled and the condition of the roads. The excavated area ran from 10 to 20 feet deep, and the major portion of spoil was used as fill between the structure and cofferdam.

Layer-banking the spoil outside the excavation lines and within the cofferdam imposed an unusual earth-moving problem on the contractor as much of the material was of a soupy consistency. The maintenance of hauling ramps and constantly shifting roads over frozen fill was also a chore.

The contract completion date was March 15, 1941, but the contractor's schedule, to which he rigidly adhered, was February 1, 1941, and all concrete was in place by January 15, 1941. Monthly progress, with a 5-day week and measured by the volume of concrete placed, was as follows:

April, 1940	Approximately	13,000	cubic	yards
May	"	24,000	"	"
June	"	28,000	"	"
July	"	28,000	"	"
August	"	35,000	"	"
September	"	30,000	"	"
October	"	29,000	"	"
November	"	10,000	"	"
December	"	10,000	"	"
January, 1941	"	3,000	"	"
Total		210,000	cubic	yards

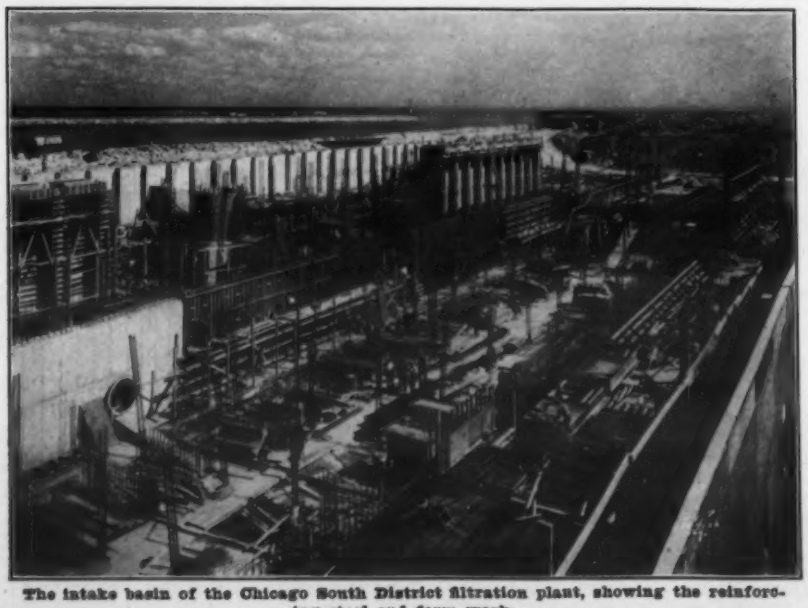
Layout of Work

Of necessity, construction had to be carried out over a very wide area. With but one point of entrance available for all supplies and materials, with the exception of the aggregate for the concrete, it can readily be seen that efficient handling of the reinforcing, forms and miscellaneous equipment presented a major layout problem. The subsequent success of all job operations of course hinged on this keystone of organization.

Preparing forms and placing steel for 1,100 cubic yards of concrete daily, the job average, over a wide area and in scattered pours varying from heavy slab to high thin walls, and columns, tunnel stubs and pier pads to intricate hopper and basin arrangements, passageways, etc. is a man-sized job. In fact it might be called a "many-men-sized" job, for about 2,000 men involving all trades were employed on a three-shift five-day week basis at the peak of operations. About 40 per cent of the concrete was placed in walls and columns; and 60 per cent in slabs from 6 to 36 inches deep.

A master plan of operation, dividing the work into four sections, was laid

(*Continued on page* 16)



The intake basin of the Chicago South District filtration plant, showing the reinforcing steel and form work.

Camp Access Roads In Houston District

Coastal Plain Difficult To Drain Quickly, Has Caused Trouble With the Temporary Roads

✦ WITHIN the Houston-Galveston area, it will very shortly be the responsibility of the Texas Highway Department to start the construction of access roads for the large camps already thronged with National Guardsmen, selectees and replacement troops of all branches of the army service. To be able to start work, a plan acceptable to both the Army and State as to location and mileage must be drawn up, and the financing must be arranged. The problems in this area are somewhat intensified by the very flat character of the ground which has a fall of about 1 foot per mile for the 50 miles from Houston to the Gulf. Added to this have been the frequent intense winter rains and prospective spring precipitation.

In District 12 of the Texas Highway Department, with headquarters at Houston, there are some 40 miles of access roads known to be needed to serve the various camps. Camp Wallace, at Hitchcock, Texas, will require about 7 miles of entirely new road which, according to present plans, will cross from Texas Route 6 for a distance of about 3,000 feet to the southwest corner of the camp, with another road from State Highway 6 along the east side of the camp to U. S. 75. At Camp Wallace the drainage channels are at Gulf level within ¼-mile of the camp, which is located some 6 miles from the shore.

At Fort Crockett, about 2½ miles of 36 to 40-foot new highway are required with a widening, of from 6 to 18 feet, of 2 miles of existing pavement. Camp Hulen, an anti-aircraft training base, offers the unusual problem of a 100-mile bombing range along the coast which will require fully 40 miles of improved highways to make these ranges readily accessible from the camp itself.

(*Concluded on page* 23)

C. & E. M. Photo

One of the four wooden access roads from State Route 6 to Camp Wallace near Galveston, Texas.

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The Future of Roadside Development—Highway Economy or Big Parks?

Roadside development is only a relatively young idea but it has caught on for the very reason that it is basically right, it makes our highways more attractive, and it reduces the costs of maintenance by eliminating the greater portion of the annual damage from erosion which heretofore has made such a hole in the maintenance department's budget. Thanks to the roadside activities of the landscape engineers of our state highway departments and the few county highway departments which are beginning to see the light, thousands of cubic yards of roadside soil which would annually have washed down onto the road and had to be hand-shoveled into trucks and hauled away, leaving the backslopes bare and unfertile, now remain on the slopes and support luxuriant vegetation that binds the soil firmly with its roots.

The use of those orphan islands where an old roadway has been straightened to eliminate an unexplained curve, leaving a short section of old roadway stranded, has added much to the interest and rest value of our roadsides. These small parks, which in Connecticut have been named for some local feature, usually have a trash can, a bench and a table. They are interesting and useful to the weary traveler who may stop there to rest and picnic. Of greater importance is their use as a place where a truck driver may pull completely off the road and take a much needed nap. This protects the unwary driver from colliding with the rear of a parked truck, and provides a greater opportunity for complete rest to the man responsible for the safe delivery of a valuable truck shipment.

Then there are the roadside parks where a source of water, tested and approved by the state health department, is available. In these parks the number of benches and tables is usually larger, one or more rustic stoves or fireplaces are installed, and if the site provides a good view, it may rightfully be extended somewhat to permit the erection of a tower or rock platform from which the traveler may enjoy the scenic features of the surrounding countryside at his leisure.

At the Ohio Short Course on Highway Development we mentioned the great value of roadside turnouts and the small parks, and expressed appreciation of the opportunities offered by the larger parks for recreation and a chance to view unusual scenery. But we also sounded a note of warning that these parks add to state highway maintenance costs. It will be well for the landscape engineer to bear in mind that highway money for construction and maintenance purposes, including roadside projects to reduce erosion, is all too scarce, due in many cases to its diversion to other uses, so that the greatest care and restraint must be exercised not to "obey that impulse" to build larger and larger parks of a recreational or bird-sanctuary type. The increasing use of highway funds for large parks rather than for highways with well-planned roadside development for greater safety and economy in maintenance may lead to a painful reckoning with the taxpayers who will be called upon to pay greater and greater defense taxes. They are now becoming thoroughly aroused on the matter of diversion of road funds to other purposes and if they see their highway money expended for parks rather than for much-

(*Concluded on page* 28)

Important Service By Road Transport To Nations at War

The following editorial, which appeared in the Monthly Bulletin of the British Road Federation and was reprinted in *Highways and Bridges* of London, England, is an interesting expression of opinion of a nation now involved in a struggle in which the maneuverability of its armed forces and their supply services may well be the difference between success or failure of those forces. The point of view expressed is one which should be given careful consideration by authorities in this country.

"Modern nations fight their wars on wheels, both at home and on the battlefields. Transport bears the life blood of our defense. Today, with the threat of heavy air attack and invasion, the civil transport of this country moves into the front line. The efficiency of its functioning under such conditions may well have a profound effect on the outcome of the struggle.

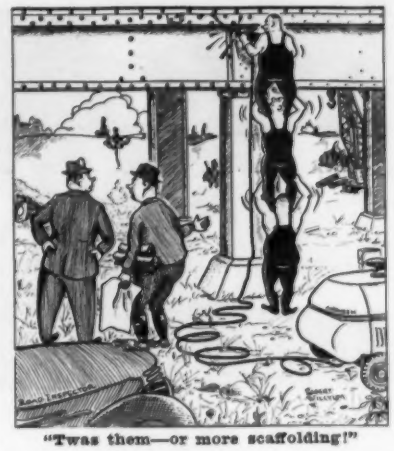
"In the event of invasion, it is probable that a 'sway' of traffic on a vast scale will occur, with swiftly changing points of supply and delivery, and that transport will have to operate under rapidly altering circumstances and in a multitude of varying capacities. The tasks to be carried out by all forms of transport can not be exaggerated, but it can not be too strongly emphasized that road transport, by reason of its flexibility and mobility, its composition of swift-moving independent and comparatively light units, can perform services impossible for the railways, which are also more vulnerable to enemy attack.

"It has been indicated that plans have been laid to utilize these qualities of road transport. But for these plans to operate effectively it is essential that there should be a sufficient reserve of vehicles in active civilian service available to be drawn upon to meet sudden demands.

"For the same reason, while the British Road Federation realizes the urgency of the need for men in garages and repair shops to enter the aircraft factories, it is earnestly hoped that the Ministry of Labor and National Service will see to it that a sufficient reserve of skilled men is left to drive, service and maintain the vehicles of the roads.

"Nor must it be forgotten that the swift repair of roads damaged by enemy attack, together with the construction of any temporary or supplementary roads that may be required, will also necessitate a readily available supply of labor.

"The disintegration of the road transport industry must at all costs be avoided. It must be maintained at a standard of efficiency sufficient to render it capable of dealing with any emergency demands that the nation may make upon it."

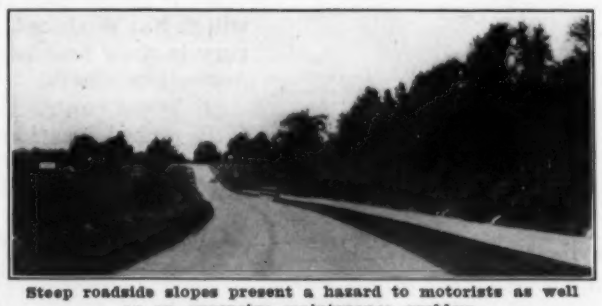


"Twas them—or more scaffolding!"

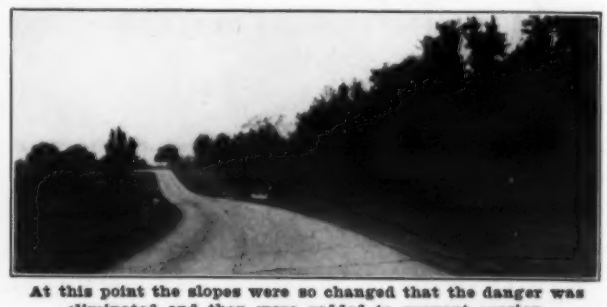
ROADSIDE JOB CORRECTS EROSION IN LOUISIANA

A 3.826-mile roadside development contract to eliminate steep eroded slopes such as these was completed in 1940 by the Glassell General Construction Co. of Shreveport, La.

The same spot on U. S. 80 in Ouachita Parish, La., after Glassell's contract was completed, showing sodded shoulders and the flattened sodded slopes. See page 33.



Steep roadside slopes present a hazard to motorists as well as an expensive maintenance problem.



At this point the slopes were so changed that the danger was eliminated and then were sodded to prevent erosion.

A striking example of badly eroded slopes before this work was started, and—

the same slopes flattened and sodded, with a native stone ditch for drainage.

J. E. Pennybacker Dies

J. E. Pennybacker, Managing Director of The Asphalt Institute, and previously managing head of its predecessor, The Asphalt Association, since 1919, died on February 25 in Florida where he had gone to try to regain his health.

Outstanding as an economist and road-building authority, Mr. Pennybacker made a great contribution to the development of the present national highway system. In 1906, after graduation from the University of West Virginia and Georgetown University, he became Chief Economist of the U. S. Bureau of Public Roads. From 1910 to 1914 he was Secretary of the American Highway Association, in 1912 he was statistician of the Senate Committee on Post Offices and Post Roads, and in 1913 was adviser to the Ontario Highway Commission.

From 1914 to 1917 he was Chief of Management of the Bureau of Public Roads. During the World War he was Secretary of the U. S. Highways Council; in 1919 was Chairman of the Road Board, American Automobile Association; and was a founder of the American Association of State Highway Officials.

New Chain Belt President

J. C. Merwin, Vice President and Treasurer of the Chain Belt Co., Milwaukee, Wis., has been elected President of the company to succeed C. R. Messinger who died suddenly on February 4. G. M. Dyke and A. F. Kessler, Assistant Treasurers, were elected Treasurer and Comptroller, respectively.

Mr. Merwin joined the Chain Belt organization in 1917 and has been successively Superintendent, Works Manager, Assistant to the President, Director, Vice President and Treasurer. Both Mr. Dyke and Mr. Kessler have been with the company since 1923.

Caterpillar's new pneumatic-tired tractor and dirt-moving wagon.

New Dirt-Moving Unit Of Tractor and Wagon

After more than 3 years of development work and field tests, a new rubber-tired industrial tractor, powered by a 90-hp diesel engine and capable of hauling more than 13 tons of earth at 18 mph, has been announced by the Caterpillar Tractor Co., Peoria, Ill. To complete the dirt-moving unit, Caterpillar has also designed and built an 11-cubic yard heaped-measure bottom-dump pneumatic-tired wagon for use with this tractor. Hydraulic scrapers, especially designed for use with this new tractor, are manufactured by the LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa, while cable-controlled scrapers are made by R. G. LeTourneau, Inc., Peoria, Ill.

Powered by a D468 Caterpillar diesel 6-cylinder water-cooled automotive engine, the DW-10 tractor weighs 14,500 pounds and has a tractive effort of 13,000 pounds in low gear, with a loaded wagon or scraper. The manufacturer states that a quick-acting vertical-type governor gives fast pick-up to get the loaded tractor and wagon to full speed almost immediately. The transmission is the constant-mesh type, and has five forward speeds ranging from 2.4 to 18 mph and one reverse speed of 3 mph. A high-traction differential gives increased pulling ability under unfavorable ground conditions, plus longer tire and engine life, it is stated. This differential applies greatly increased torque to either driving wheel, should the opposite wheel start slipping, and in addition to increased pulling power, this increase in torque lessens tire slippage as well as keeping a more even load on the engine. The braking system consists of foot-pedal-operated independent hydraulic brakes for each rear wheel of the tractor. A lever-operated vacuum booster acts on both the tractor brakes and the hydraulic brakes on the rear wagon wheels for stopping the unit. The non-stop turning radius of the tractor and wagon is only 20 feet.

The Caterpillar W-10 wagon has 8⅓ cubic yards struck-measure capacity and 11 cubic yards heaped-measure capacity. The body is of the hopper type and is made of pressed shapes formed from plates of special alloy steel, of all-welded construction for maximum strength. The body measures 13 feet 2½ inches in length x 6 feet 11 inches in width at the top, 10 feet 10 inches x 4 feet 9 inches at the bottom, and is 3 feet 6 inches deep. A rear bumper is provided to facilitate dumping or loading operations where a bulldozer is required and also to protect the rear wagon wheels. The full-length bottom-dump doors are hydraulically operated from the tractor, and are designed to permit ejection of material at any desired speed. There are approximately 31 inches of clearance with the doors in hauling position, and 13½ inches clearance with the doors open to a maximum.

The tires for the wagon are the same size as those used on the DW-10 tractor, 18.00 x 24 16-ply. The tractor-wagon combination weighs 24,500 pounds and measures 32 feet 8 inches in length.

Forms For Highway and Airport Construction

The Superior Type road form is the original Heltzel design with 2½-inch tread, upturned base flange, extended lock-joint guide for easy setting and aligning, and the non-clogging single-wedge stake pocket which does not permit the forms to move. To these features, according to the manufacturer, has been added a special new steel formula which combines maximum working qualities with greatly increased rigidity and strength.

The Heltzel Military highway form combines all the above items with full ¼-inch steel plate meeting the accepted standard for slab construction over 16 feet wide, where heavy subgrade and finishing-machine equipment is used.

Both types of road forms are described and illustrated in Bulletin B-19, copies of which may be obtained direct from the Heltzel Steel Form & Iron Co., Warren, Ohio, by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Selected Equipment Speeds Reservoir Job

San Fernando Reservoirs In California Improved by $350,000 Job for Los Angeles Water Department

By OWEN H. BARNHILL

✦ THE advantage of using equipment of the latest improved type on a large earth-moving contract was demonstrated recently at the San Fernando Reservoirs, 25 miles north of Los Angeles, Calif., where 1,000,000 yards of dirt was excavated and placed in embankment. Record time was made on this somewhat unusual project by Clyde W. Wood, Los Angeles contractor, who purchased a number of large machines to move the reservoir material as quickly and cheaply as possible. Work began in July, 1940, and was finished on schedule time, January 15, 1941.

Improvement of the upper and lower San Fernando Reservoirs, costing approximately $350,000, was made necessary by two unusual floods within the past two years which carried considerable sediment from the local drainage area into the upper reservoir, greatly reducing its capacity, and indicating the need of protecting the structure in future downpours.

All reservoirs directly supplied by natural streams and unprotected by settling basins have their capacities reduced by sedimentary deposits, and in time must be dredged out or abandoned. It is stated that even Lake Mead, above Boulder Dam, will fill up with silt in 200 years. For 20 years, San Fernando Reservoir received no appreciable sediment. During the 27 years since the reservoir was built, extensive near-by areas have been put into cultivation, and large unprotected highway fills have been made, increasing erosion and the consequent silt content of flood waters, and in the two unprecedented floods of January 1934 and March 1938, during which 8 inches of rain fell in a few days, a large amount of silt was deposited in the reservoir.

San Fernando Reservoir, 1,200 feet above the nearby ocean, is a storage and distributing basin for the Los Angeles Aqueduct which brings many million gallons of water daily 325 miles from the Owens River watershed in the high Sierra Mountains to the southern metropolis for domestic, industrial and irrigation purposes. Mountain water pours into the reservoir through a 10-foot steel pipe and thence is distributed to all parts of Los Angeles and the San Fernando valley.

The present project consists of an embankment or dike constructed above the reservoir to deflect sediment-laden flood waters, an 8,000-foot canal or storm drain to carry these flood waters around the west side of the reservoir, a short section of concrete pipe, and paving of the canal and dike. In addition, it was decided to strengthen the reservoir with excavated material as well as to widen the base of the dam to a uniform slope.

The dikes contain 278,000 cubic yards of excavated material, the canal required 450,000 yards of excavation, of which 240,000 yards was used to strengthen the reservoir's earth-fill dam. In order to widen the dam with a blanket of earth on the down-stream side, its 3 to 1 slope was increased to 4½ to 1 which required 210,000 additional yards of material, excavated from hills just east and west of the dam. The spillway extension is 3,000 feet long, required 23,000 yards of excavation, 14,000 yards of embankment fill and 1,200 yards of 6-inch concrete lining. The canal is lined with 6,000 yards of 6-inch concrete, while the canal berm was paved part way with a 3 to 4-inch layer of rock, oil, asphalt and concrete, totaling 144,000 square feet. The dikes are protected by 513,000 square feet of similar paving.

An A-C diesel tractor and Southwest Welding Co. sheepsfoot roller compacting fill at San Fernando Reservoir in California.

The contract price for excavation was 15 cents; embankment fill, 5 cents; paving, including materials, 4½ cents; canal concrete lining, $6; and concrete pipe, $42,277 for the job. The latter included building and installing 3,000 feet of 87-inch monolithic concrete conduit which extends from Grapevine Canyon at San Fernando Road across Sepulveda Boulevard and connects to the upper end of the canal through the debris basin.

Canal Construction

The canal is 10 feet deep, 15 feet wide at the bottom and 40 feet wide at the top, with a side slope 1¼ to 1. When

(*Concluded on page 40*)

E. C. Gledhill and his new Gledhill motorized sod cutter.

A One-Man Machine Cuts Sod by Power

What is believed to be the first one-man motor-driven sod cutter is now being produced by the Gledhill Road Machinery Co., Galion, Ohio, according to E. C. Gledhill, President. The machine depicted travels at ½-mile an hour, cutting a 24-inch wide sod to any depth from ½ inch to 3 inches by means of an oscillating pitman bar and circular knives at the sides, and is claimed to work at the rate of 500 square yards an hour. Best results are obtained from the shallow ½-inch depth, according to Mr. Gledhill, because of the lighter hauling weight and better knitting qualities with prepared ground. After the sod is cut by the machine, it is ready for rolling, hauling and placing.

Further information regarding this unit may be secured by interested contractors and highway department engineers direct from E. C. Gledhill, by referring to this item and magazine.

Sliding Steel Curtains For Temporary Partitions

One of the problems in planning the efficient use of state or country highway garages or shops is that of placing partitions to provide small stalls or workrooms where they are needed, without interfering with the use of the main floor of the building.

In order to solve this and similar problems of providing temporary partitions, the Cornell Iron Works, 36th Ave. and 13th St., Long Island City, N. Y., makes the Cornell Sliding Grille, which is a flexible steel mesh curtain hung from an overhead track so that it may be moved along the track to change the location of the stall or storage spaces as desired. Made of heavy galvanized chain link mesh, it is extended to any height of opening by galvanized vertical rods running to the supporting track above.

Copies of a new catalog describing this sliding grille and containing photographs of its many applications may be secured by those interested direct from the manufacturer by mentioning this item.

Goodrich Personnel Changes

Several changes have been made in the sales staff of the Mechanical Division of the B. F. Goodrich Co., Akron, Ohio. A. W. Doran has been assigned to special duties with railroad and government sales; B. E. Silver, Sales Representative in Indiana, has been transferred to government sales in Washington, D. C.; and W. E. Nees succeeds Mr. Silver, with headquarters in Indianapolis. Ralph Barcus of the Akron district staff succeeds Nees in the West Virginia territory, with headquarters in Charleston.

Portable Chain Saws With Variable Power

Chain saws have a wide utility in the civil engineering construction field on bridge work for cutting both timbers and piles and to road builders for felling and buckling trees. Mall chain saws with gasoline-engine, air or electric power are compact, of simple design, light in weight and are readily portable.

The pneumatic chain saws are especially adapted for topping poles and cutting piles under water and can be furnished with various sizes of vane or piston-type air motors for the 24, 36 and 48-inch models. Each chain saw has a special lubricant reservoir for the proper lubrication of the unit during operation. Cuts through a 24-inch water-soaked oak log in less than 1½ minutes are reported.

Electric-driven chain saws are available with 1½-hp universal electric motors for operation on 110-volt AC or DC current, or 220-volt AC or DC current; also 2-hp 3-phase motors for 110/220 or 220/440-volt current for the 24, 36 and 48-inch models.

A Mall chain saw with an air motor.

Complete information regarding this line of saws, as well as Mall electric drills, mortisers and vibrators, will be found in Form No. 212 which may be secured direct from Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill.

Marking the Tanks An Aid to Refueling

Following an unfortunate incident which delayed getting numerous pieces of equipment to work one morning on the Franklin Falls flood-control project, Coleman Bros. Co. of Boston, Mass., took steps to insure against improper refueling.

A new and over-zealous night fuel-truck driver with a full load of diesel oil visited every piece of equipment on the job and filled its tank with diesel fuel. The next morning when the operators tried to start the gasoline engines, they experienced considerable difficulty.

We do not know what happened to the truck driver, but we can guess! However, as a result of his over-zealousness, every fuel tank of every piece of equipment was well-labeled to prevent a recurrence of the incident by painting on it the type of fuel used by that engine.

Minnesota Highways Get High Maintenance Rating

During the past six months the trunk highways in Minnesota have been in the best maintenance condition in their history, according to reports of the Public Roads Administration engineers. The arithmetical average of Federal ratings, based on the condition of driving surfaces, shoulders, roadsides, drainage, bridges and culverts, for the last half of 1940 was 89.5 per cent.

Continued improvement over the past 3 years, with the exception of a period immediately following the widespread destructiveness of the spring break-up of 1939, is reflected in the following comparative averages: in 1938, the average for the first half of the year was 83.3 per cent and for the second half, 85.6; in 1939, the averages were 84.3 and 86.8 and for 1940, 87.7 and 89.5 per cent, for the 7,125 miles of state highways.

C. & E. M. Photo
Busting boulder—NOT ledge—on the Forrest Construction Co.'s 2.26-mile grading job in New Hampshire.

N. H. Road Project Corrects Frost Boils

(*Continued from page* 1)

excavated was filled with boulders from ¼ to 2 cubic feet in volume, just a mean size for a shovel to handle.

The One Legitimate Fill

No contractor or engineer considers the placing of a couple of feet of material over an old road bed as legitimate fill and that is what most of the fill on this contract amounted to. However, near the center of the job on the 1,000 foot cut-off, there was 600 feet of fill from 8 to 9 feet high which was comprised, almost entirely, of material excavated at either end of the relocation. The trucks end-dumped and the material was spread with a second International T-35 and Bucyrus-Erie bulldozer.

Also near this section a 36-inch extra-strength reinforced-concrete pipe culvert was installed, replacing an old 2 x 2-foot reinforced-concrete box culvert. The trench for the new 76-foot pipe culvert was dug by a Lorain 40 with a back-digger.

Drilling Outfit

For all of the drilling required on this job the contractor used a Gardner-Denver 210-cubic foot air compressor mounted on a truck, and for part of the time a new Schramm streamline portable compressor which was on trial. A complete outfit of Gardner-Denver jackhammers was used. All rock was blasted with Atlas 40 per cent gelatin dynamite.

The rock, both from disintegrated ledge and the block-holed boulders, was put into the fill but the contractor had a hard time getting enough good dirt to cover the rock.

Handling Silt Pockets

The frost heaves on this highway have been very embarrassing as it is the third most heavily traveled state highway in New Hampshire; consequently, the elimination of all silt pockets was imperative. In addition to the silt pocket and spring met at the east end of the job, a series of bad pockets was encountered near the center of the job where there was ledge on one side and a swamp on the other side of the road. All of the silt was excavated and stockpiled for use on the shoulders to speed up the growth of grass. Then 3 feet 9 inches of gravel backfill was placed in the pockets and on top of this the regular gravel base-course material was spread.

Surfacing

The contract called for the placing of a 24-foot finished mixed-in-place roadway on the primed base, using crushed gravel as aggregate for the 3-inch course sealed with sand.

Personnel

This contract, which has a series of Federal-Aid numbers, was started on June 14, 1940, with 80 working days allowed for its completion. Emery Forrest acted as his own Superintendent on this job, and for the State Highway Department, Fred Whitney was Resident Engineer.

Brand Your Tools For Safe-Keeping

Are you losing any tools? If so, you will be interested in the inexpensive, efficient and simple branding iron made by the Everhot Mfg. Co., Maywood, Ill., which can be used to brand tools, sheeting, scaffolding plank, scaffolding horses, ladders, wheelbarrows, tires and other equipment in use by contractors or state and county highway departments.

A folder issued by this company describes and illustrates specimen brands, heating torches available and the steel kit for carrying the tools. Prices on all items are given. Copies of this folder may be obtained from the manufacturer.

Asphalt Plant Mixes 24,000 Tons; Moves On

Asphalt Paving Service Had Plant at Providence Forge, Va., for Local Work, Set Up At State Sand Pit

(*Photo on page 52*)

✦ HAVING production contracts amounting to 24,000 tons of hot-mix retread on U. S. 60, south of Richmond, Va., and in adjacent territory, Asphalt Paving Service, Inc., of Richmond set up one of its portable asphalt plants at the Department of Highways' sand and gravel pit west of the highway near Providence Forge, Va., in April, 1940, and started producing on May 15, for state work.

With the production of the state washing and screening plant insuring a constant ample supply of material, work was not lacking from the start until the plant closed down early in September and was moved.

Feeding the Plant

The washed screened sand from the state plant was hauled by shuttle trucks and stockpiled by dumping from an overhead ramp. The material was moved to the barricade through which it was fed to the cold material elevator either by moving it from more distant parts of the stockpile with a P & H crane equipped with an Owen ⅝-yard bucket, or a Caterpillar Thirty with a LaPlant-Choate bulldozer climbed all over the pile and kept it moving toward the bulkhead. During the latter part of the work when one of the contracts called for additional fine sand, the crane was sent to a section of the pit where fine sand was abundant and produced sufficient to keep the plant operating while the tractor and bulldozer fed the cold material elevator.

Texaco asphalt was delivered in tank trucks from Norfolk, Va., some 70 miles south of the plant and was stored in a 10,000-gallon tank and a 4,000-gallon heating kettle. It was transferred from the trucks to storage and from the tanks to a loop of pipe with continuous circulation from which the asphalt was drawn to the weigh bucket by an Iroquois asphalt pump.

Drier and Dust Collector

The bucket elevator raised the material to the Simplicity System drier 8 feet in diameter and 15 feet long. It was heated by a Ray burner in which the fuel oil and air are blown through the atomizer by a steam turbine. A hot elevator then raised the dry materials to a rotary screen equipped with ¾, ⅜, ¼-inch and 10-mesh screens which delivered the material to the four compartments of the Cummer steel bin, each holding 15 tons. In assembling this plant the contractor reduced the size of the bins to increase the portability of the unit, removing 12 feet from its height, because it was to be used where large storage capacity was not necessary. A Thwing pyrometer installed in the chute to the hot elevator indicated the temperature of the hot material and was used as an indicator to regulate the flow of cold material to the drier.

C. & E. M. Photo
A pair of 100-hp International diesels furnished the power for the Asphalt Paving Service's hot-mix plant at Providence Forge, Va.

To reduce the baptism of fine sand about the plant a Clarage fan was installed to create an induced draft through the drier by pulling through a cyclone in which the fine sand and dust were trapped.

The Power Plant

A new Erie City Economic horizontal steam boiler of 75-bhp capacity fur-

(*Concluded on page 25*)

C. & E. M. Photo
M. J. Crowley (left), Resident Engineer for the Mass. Department of Public Works and Martin DeMatteo, contractor.

Skew Arch Bridge Built on Radius

M. De Matteo Constr. Co. Built New Concrete Bridge With Falsework Skewed to Abutments; Good Foundation

✦ EXTENDING a new boulevard highway from Mattapan Square, Boston, Mass., along the shore of the meandering Neponsett River, the Massachusetts Department of Public Works is creating a new cut-off between Mattapan Square and Paul's Bridge, Readville. A new bridge, built during the summer of 1940 by M. De Matteo Construction Co., of Roslindale, Mass., carries the highway across the river and on to Milton Street from which there is access to Routes 1 and 138.

The contract for the new 0.345-mile long bridge, FAP 244-C (1), was awarded on the low bid of $156,888.62. The structure is a single-arch span, skewed to the abutments and also built on a radius. The span is 60 feet perpendicular to the abutments and the arch is semi-circular, 74 feet in diameter, with a rise of 12.5 feet from the spring line. The arch is 45 inches thick at the spring line and 16 inches thick at the crown.

The falsework piles were placed 3 feet from the abutment, then two spaced at 5 feet each, six at 8 feet each, then two more at 5 feet each and the last, 3 feet from the far side. These piles were all driven with a No. 6 McKiernan-Terry steam hammer operated from a portable steam boiler. The contractor elected to put up his falsework on a skew with the abutments. Both abutments were built within cofferdams of steel sheet piling driven by the steam hammer, with the excavation carried to a depth giving a 9-foot head of water on the outside of the cofferdam. The footings are 20 feet wide, 3 feet high and 112 feet long, and rest directly on hardpan. The contractor used 8 x 12-inch timber as centering on posts carefully set to the grade, then set 3 x 8's cut in the yard and with templates on them and then 1 x 6-inch form lumber with no plywood, as no special finish was required. The concrete was all Whittemore transit-mixed concrete delivered to the forms by chutes.

The top of the barrel was waterproofed with 3-ply membrane waterproofing mopped with Koppers roofing tar and all of this covered for protection with concrete brick set in cement mortar. The entire outside of the bridge and the hand rail on the inside has an attractive granite masonry facing.

The design of this structure required the use of 126 tons of reinforcing steel in the arch alone.

Personnel

The new skew arch bridge over the Neponsett River, FAP 244-C(1), was built by M. De Matteo Construction Co., of Roslindale, Mass., under the direct supervision of Horace Del Grosso. For the Massachusetts Department of Public Works, M. J. Crowley was Resident Engineer, assisted by H. W. Walsh and Bob Horn, Assistant Civil Engineers.

Thew Shovel Promotions

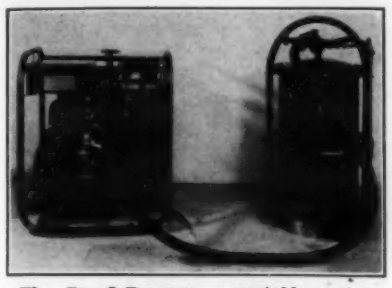
A number of personnel changes and promotions have recently been announced by the Thew Shovel Co., Lorain, Ohio. D. G. Savage, who has been with the company since 1919, was promoted from Sales Manager to General Sales Manager in complete charge of all Thew sales operations.

M. B. Garber, who has been Sales Office Manager, Export and Sales Promotion Manager, has been appointed Assistant Sales Manager as well as Export Manager, while J. L. Beltz has been made Manager of Sales Promotion. R. T. Cobb, who has been Mr. Garber's assistant, has been appointed Sales Office Manager.

J. W. Shields will continue as Canadian Sales Manager, with supervision over an expanded territory covering the entire Dominion of Canada, except British Columbia, as well as the Buffalo, N. Y., territory. H. H. Buchanan is promoted from District Sales Manager to Western Manager of Sales in charge of Thew activities in the eleven western states and British Columbia. J. T. Connors has been appointed Assistant Manager of Used Equipment Sales, which position he will hold in addition to that of District Sales Manager for the Chicago and Minneapolis territories.

Seth Klein New Assistant At Marmon-Herrington Co.

The Marmon-Herrington Co., Inc., has announced that Seth Klein, who for the past 8 years has been Sales Manager of the Detroit Gear & Machine Division of the Borg-Warner Corp., has returned to Indianapolis as Assistant to Bert Dingley, Vice President of Marmon-Herrington.



The Pur-O-Pumper, a portable water purification plant.

New Purifying Unit For Drinking Water

The problem of supplying pure drinking water is one which confronts many contractors on construction jobs in remote and isolated places. To meet this problem, Proportioneers, Inc., 9 Codding St., Providence, R. I., has brought out a portable water purification unit, known as the Pur-O-Pumper, which is divided into two sections, one of which is the treating unit and the other a filter.

The treating unit consists of a gasoline-engine-driven pump, a hypochlorinator, chemical feed devices for the concurrent application of two water treatment chemicals such as soda ash and alum, a hypochlorite solution reservoir, and all piping, hose and accessories necessary for the operation of these units, all mounted on a seamless steel-tubing frame. The filter section is constructed of Monel metal with seamless steel tubing guards to protect it from rough handling.

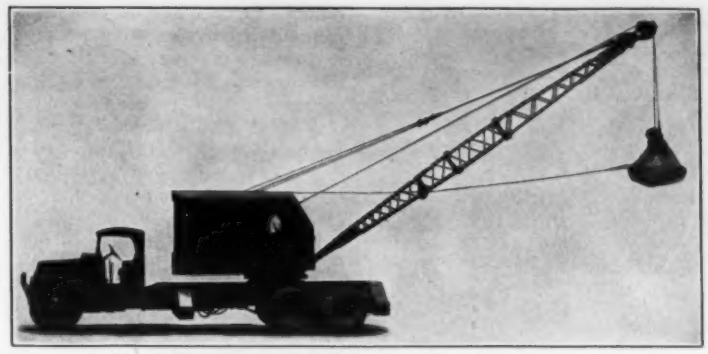
The entire plant weighs only 750 pounds, occupies a space 4 x 6 x 4 feet, and can be carried to the job in a truck along with tools and supplies. On the job, the Pur-O-Pumper is set up near a steam, its 20-foot suction lift making possible its location on a steep bank, and the suction hose is placed in the stream. The single-cylinder gasoline engine for the pump is started, the water is treated with coagulent chemicals, soda ash and alum, and chlorine for sterilization as it is pumped into the filter where, in a bed of sand and gravel, the turbid particles are separated out and a clear stream of pure water flows out of the effluent side of the filter. The rate of flow depends on the turbidity of the raw water, but it is stated that with a 100-ppm turbidity, which is very muddy, the Pur-O-Pumper will supply 15 gpm of sterilized and clarified water. With water of this turbidity, 2,000 gallons can be pumped without backwashing the filter.

Further information on the Pur-O-Pumper may be secured by those interested direct from the manufacturer by referring to this item.

Making America Strong

This is the theme of a new 8-page folder recently released by R. G. LeTourneau, Inc., Peoria, Ill., manufacturer of tractor-drawn earth-moving equipment. Job photos and facts show how equipment development makes possible the high-speed progress required of America's defense program, and construction progress on airport, roadway, water-power, irrigation and housing projects is graphically illustrated and described. LeTourneau Carryall scrapers, 'Dozers, Rooters and cranes are shown handling various governmental projects from coast to coast and the Tournapull is shown at work on long haul earth-moving jobs, such as airport and canal construction.

This red, white and blue folder, No. A-13, has been prepared for township, county, state and Federal officials, as well as contractors interested in governmental contracts. Copies may be obtained direct from the manufacturer by mentioning this item.

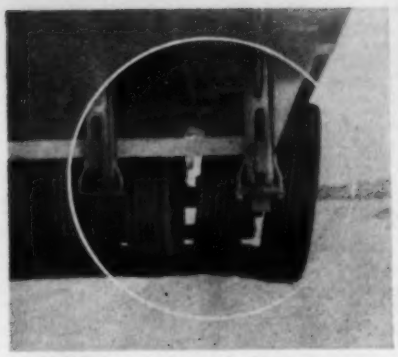


The new Northwest Model 20 truck crane.

A New Truck Crane

A truck crane of 15 tons capacity has been added to the line of four Northwest truck cranes ranging in capacity from 4½ to 18 tons manufactured by the Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill. The new Model 20 is equipped with "feather-touch" clutch control and also with a power-up and power-down boom hoist, an independent boom hoist functioning as its name implies in raising or lowering the boom. A single lever is used to control the functions of boom hoisting, boom lowering and braking. An engine throttle control is also provided.

Full details of the Northwest Model 20 crane will be supplied by writing direct to the manufacturer.



A feature of the new Roll Tamp pneumatic-tired roller is the oscillating wheels to conform to grade variations.

Rubber-Tired Roller For Base Compaction

Highway engineers have for some time recognized the advantages of rubber tires in the compaction of sub-base and bituminous-bound or stabilized road and airport-runway surfaces. To simulate but intensify the action of rubber-tired vehicles driving over the road, a new pneumatic-tired roller which is claimed to duplicate the action of traffic has just been announced by the Madsen Iron Works, Huntington Park, Calif.

This new Roll Tamp roller is equipped with eight wheels, equally spaced across the width of the machine. The wheels are mounted on four axles, two pneumatic-tired wheels per axle, and each axle is pivoted at its center upon greaseless bearings which are carried in a single walking beam hinged to the front of the machine in a greaseless bearing and operating in a spring-loaded guide at the rear. This mounting allows each pair of wheels to rise vertically and to oscillate, in order to conform to any variations in grade.

The Roll Tamp may be loaded either with sacked sand or some other ballast to obtain various weights up to a total gross of 8,000 pounds. The deck of the roller is 80 inches wide x 84 inches and the drawbar is 42 inches long, making a total overall length of 10 feet 6 inches. The total overall height is 32 inches. The tires are 6.00 x 16 in size, of the 6-ply groove type, and are easily changed.

Two or more rollers may be trailed one after the other in staggered position to provide greater coverage, and the roller may be used as a trailer to carry small paving tools or equipment.

New Bulletins Describe Two Distributor Models

Two new bulletins have recently been issued by E. D. Etnyre & Co., Oregon, Ill., No. 508BB being devoted entirely to its Model MX Black-Topper distributor, and No. 510 applying to Model FX-400.

Among the features of these distributors is the oversize opening from the tank through the intake valve on down through the pump into the spray bars which, according to the manufacturer, reduces friction, and because application is regulated by pumping no more than it sprays, less power is required to drive the pump. Extremely short lines and compact design all pitched to one central point simplify cleaning.

Construction features are described and illustrated in these bulletins and standard equipment specifications are given. Copies of both or either of them may be obtained direct from the manufacturer by mentioning this item.

The new LaPlant-Choate Carrimor scraper especially designed for use with the new Caterpillar pneumatic-tired industrial tractor.

High-Speed Scraper For Wheel Tractor

Designed for use with the new Caterpillar rubber-tired tractor, the new hydraulically operated Carrimor scraper just announced by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, is a high-speed dirt-moving scraper which loads, transports at speeds up to 18 miles an hour, and spreads earth or other material under its own power. Finger-tip hydraulic control of the scraper matches the hydraulic brakes and steering of the tractor. Hydraulic rear-wheel brakes on the scraper are operated simultaneously with the brakes on the tractor.

One of the features of this new scraper, known as the Carrimor CW-10, is the honeycomb construction of the bowl bottom to provide greater strength and rigidity. Another exclusive feature is the independent apron operation which permits uniform spreading of any material from sand to gumbo. The scientifically bowed design of the cutting edge makes loading easy and fast, and an improved guide arrangement insures the correct operation of the rear ejector gate. The scraper's low center of gravity is claimed to eliminate bobbing, weaving, twisting and the danger of jack-knifing, as well as adding to the operator's comfort.

The capacity of the Carrimor CW-10 is 8.75 cubic yards struck measure, and 10 yards heaped measure. The unit is mounted on 16-ply 16.00 x 20 tires.

Paving Operations On Maryland Route

Variety of Equipment with Uniformity in Results on Six Concrete Paving Jobs On U. S. 40 Relocation

By EDWARD H. NUNN, Construction Engineer, Maryland State Roads Commission

(*Photos on page* 52)

✦ THE paving operations on the various contracts for the relocation of U. S. 40 in Maryland, between Baltimore and the Delaware state line, were very similar. On the contracts where reinforced-concrete pavement was called for, namely Ce-214, Ce-222, Ce-208-1, Ce-208-2, Ce-209-1 and Ce-209-3, all the contractors used one paver for both courses.

C. J. Langenfelder & Son, which was awarded three contracts on this project, was the only contractor to set up its own aggregate batching plant at the job site. This plant was on the east bank of the Susquehanna River just south of the Susquehanna Bridge. Bulk shipments of sand and gravel were by scow, and bulk cement was received by rail. This contractor used a Rex 34-E dual-drum paver and his production averaged 3,200 feet of 12-foot lane a day. No other contractor averaged over 2,000 feet a day.

The other contractors elected to batch direct from commercial aggregate plants with hauls of from 4 to 8 miles. All contractors used bulk cement which permitted them to take advantage of the 10 per cent overload allowed on their pavers. Phillips Bros. used a Ransome 27-E dual-drum paver, and the other pavers used were all 27-E units, made by Koehring, Foote Co. and Chain Belt.

The specifications required that the pavement be laid in 12-foot traffic lanes. Carr form line cutters were used on most of the contracts to prepare for the setting of the forms and R-B subgrade cutters were used on all the contracts to form the subgrade. Blaw-Knox self-aligning forms were used generally, and on the sub-base sections 30-inch pins were used to keep the forms rigid.

Only three contractors, C. J. Langenfelder & Son, M. J. Grove Lime Co. and McHugh Bros., elected to use concrete spreaders. Langenfelder and McHugh used Jaeger spreaders and Grove a Blaw-Knox. Both machines gave a uniform density of concrete and made possible economical installation of the reinforcing mesh, while their use on the top course made possible quicker finishing.

On finishing, a tolerance of 1/8 inch per 10 feet of horizontal length was permitted. Both transverse and longitudinal finishing were mandatory. The transverse machines used included Lakewood, Ord and Jaeger units and all the contractors used Koehring longitudinal finishers. It was unnecessary to do any appreciable grinding on the project, although there were a few instances where the joints had to be cut down.

This Rex 34-E dual-drum paver used by C. J. Langenfelder & Son on the relocation of U. S. 40 in Maryland averaged 3,200 feet of 12-foot lane a day.

Joint Installation

The expansion and the contraction joints all had load-transfer assemblies, about 65 per cent of which were furnished by the Dow-Weld Co. and 35 per cent were U-dowel joints furnished by the Virginia Steel Co. Sponge rub-

(*Concluded on page* 30)

Concreting Well-Organized For Huge Filtration Plant

(*Continued from page 2*)

out for the job and, with the exception of minor variations, was followed throughout the course of construction. Each week-end, pours for the following week were marked out on a plan-view chart and copies given to all the foremen. Detailed costs on each day's operations and a weekly cost sheet balanced with the time book provided a ready check against the estimates at all times.

It was found expedient to start concreting on the north side of the structure, progressing south and west, towards the source of incoming supplies at the southwest corner of the cofferdam. The contractor's five Northwest cranes used on excavation were kept busy moving materials to the point of use as they were trucked in.

To illustrate some of the details of the form work involved, let's remove the forms from monolithic walls 23 feet high and spaced 2½ feet apart. Plywood panels, ¾-inch x 4 feet x 8 feet, placed on end and having band irons attached for removal, served as the inside form for the second wall. The form was backed by greased pipes placed between the plywood and strips of up-ended boards against the wall previously poured and stripped. In order to pull the tie rods holding this inside form, a nut 1⅝ inches long was left on the inside end of the rods in the first wall poured. Ties for the second wall were screwed into these nuts and removed while the concrete was still green.

Another interesting side-light of the job was the manner of investigating or proving a point of design. With a foundation of leveling piers seated on solid rock and bottom slabs 14 to 35 feet below lake datum, the plant was designed to resist any hydrostatic upthrust with all the basins emptied. Among other precautions to eliminate flotation in any eventuality, anchor rods between foundations and bed rock were specified throughout the structure. There was some question as to how deep these rods should be set to develop the strength of the steel and not break out the rock. The test required was a maximum pull of 280,000 pounds on four 1¼-inch square rods set on 2-foot 6-inch centers in a square and pulled simultaneously. The rods were embedded in cement grout in 3½-inch diameter holes drilled 6 feet deep. To make these tests, 24-inch 100-pound I-beams, cribbed for height, were rigged with 200-ton jacks with indicating gages.

Concrete Mixing Plant

Considerable thought was given to the selection and layout of a central mixing plant. From the standpoint of economy, water transportation of aggregates was desirable, and it happened that the northeast corner of the cofferdam was the only point accessible to the large material boats operated in the Chicago territory. However, rail transportation was another possibility, and in this case too the north side of the cofferdam was the only feasible location for spur tracks without serious interference to normal traffic about the job site.

Sand and gravel aggregate were freighted across Lake Michigan and delivered by boom conveyor to the batching and mixing plant which supplied the concrete for the Chicago South District filtration plant.

Because of the excessive ranges required in placing the concrete, there was no particular advantage in spotting a mixing plant at any one point immediately adjacent to the work, and it was found that trucking wet batches from a single large plant to the various concrete pumping units would be a more flexible and economical arrangement than transporting and rehandling aggregates for two or more separate mixing plants set directly over the concrete pumps.

Sand and gravel were brought by boat across Lake Michigan from Ferrysburg, Mich., in 2,500-ton loads and

(*Concluded on next page*)

Giant Filtration Plant For Chicago Water Supply

(*Continued from page* 16)

stockpiled by means of the 135-foot boom conveyor with which this type of Great Lakes sand boat is equipped. The aggregates were stocked around a 3-partitioned tower which was a 5 to 6-foot tank with gates on three sides for feeding sand or gravel onto the 250-foot Barber-Greene belt conveyor which went underground on the fourth side and delivered the aggregate to the bins. When the piles were too low for self-feeding, a crane with a 2-yard clamshell recast the material over the gates. The material company supplying the aggregates was responsible for this operation.

Bulk cement was brought in from nearby mills in bottom-dump railway cars and delivered by Butler bucket elevators to the Butler bins. The concrete plant consisted of six Rex 28-S mixers on one platform beneath the 450-cubic yard bins. The mixers discharged into 2-yard receiving hoppers over truck runways so arranged that all six mixers could be operated simultaneously without confusion or traffic jams. The bins were made up of three complete sets of 150-yard 3-compartment units equipped with individual cement compartments and elevators and three-beam weigh batchers, and were set over two mixers and joined together for economy of erection and for loading from one 250-foot belt conveyor. The three units can be set up as independent plants on future work.

Concrete Characteristics

The following are the proportions and characteristics of the concrete used on this job:

Weight of materials (1-cubic yard batch)	
Cement	564 lbs.
Sand	1,380 "
Washed gravel, ⅜ to 1½-inch	2,010 "
Mix proportions	
Cement	1
Sand	2.45
Gravel	3.56
Sand-Gravel ratio	1.46
Specific gravity of aggregates	
Sand	2.67
Gravel	2.65
Typical sand screen analysis	Per Cent Passing
⅜-inch	100
¼-inch	96.6
No. 16	16.1
No. 50	11.6
No. 100	0.9
Slump	
In slabs	1½ to 3 inches
In walls	2 to 4 inches
Strength	3,700 to 5,500 lbs. at 28 days

Concrete-Placing Method

All concrete was pumped into place through 8-inch pipe lines by Rex Pumpcretes. Two double units, with a maximum capacity of 65 cubic yards an hour each, placed most of the concrete, while two single-cylinder units were used intermittently for scattered pours and pick-up work, such as the 16-foot intake shafts and tunnel stubs, high thin walls, pier pads, and columns.

To gain the maximum flexibility of operation, the Pumpcretes were set up at strategic points along the north bank of the cofferdam and charged by dump trucks shuttling 2-yard wet batches from the mixing plant. The units were shifted occasionally at the dictates of general convenience and in the latter stages of the work, one of the double pumps was moved to the south side of the structure to avoid excessively long pipe lines. On a ½-mile round-trip haul, four trucks were required to keep the larger pumps running to capacity.

Sometimes it was necessary to run one of the Pumpcretes from Monday through Friday without washing out, cutting from one pipe line into another and dry-lining toward a new point of placement as individual pours were completed. In such cases, the abandoned pipe lines were blown out with compressed air behind a burlap "go-devil," although water was ordinarily used for this purpose at the end of normal pumping operations.

The maximum distance pumped (allowing for a friction loss of 40 feet for 90-degree L's and 20 feet for 22.5 degree L's) was 1,700 to 1,800 feet, with about 700 feet the average. The largest pour in an 8-hour period with one machine was 522 cubic yards, and the largest volume placed in any one day was 2,600 cubic yards. In August, 35,000 cubic yards of concrete was pumped into place.

Compressor House and Shop

In the compressor house the contractor had a 1,000-foot two-stage Sullivan compressor, while Gardner-Denver, Ingersoll-Rand and Sullivan portable compressors were used about the job.

In addition there was a large amount of miscellaneous equipment required for a job of this size, including saw rigs, wagon drills, pumps, pneumatic tools, Mall electric concrete vibrators and two Kelley concrete surfacers.

Personnel

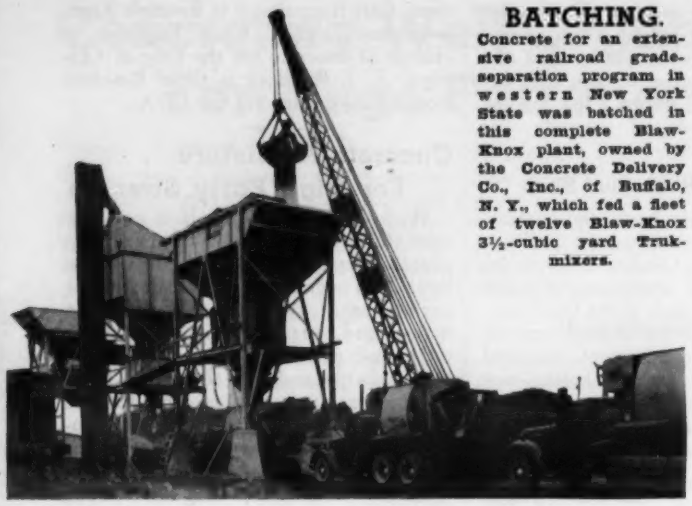
The contractor for this $6,000,000 substructure for the Chicago South District filtration plant was Michael Pontarelli & Sons of Chicago, with Irwin Baker as Superintendent of Construction. Carl Riggenbach is Resident Engineer, and John A. Egan, Engineer in charge of concrete for the City of Chicago. L. J. Ruddock is Chief Resident Engineer-Inspector for the PWA.

Concrete Admixture For High Early Strength

High Early Pozzolith is a concrete admixture which acts as a dispersing agent, releasing the cement particles to their full efficiency, increasing their surface areas available to the wetting action, and thus promoting more thorough and earlier hydration. In addition, it is claimed that the use of High Early Pozzolith makes possible the use of 15 per cent less water to get complete placeability and thorough hydration.

A new folder discussing the use of High Early Pozzolith in all types of concrete work has recently been issued by The Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio, which will be glad to send copies on request.

BATCHING. Concrete for an extensive railroad grade-separation program in western New York State was batched in this complete Blaw-Knox plant, owned by the Concrete Delivery Co., Inc., of Buffalo, N. Y., which fed a fleet of twelve Blaw-Knox 3½-cubic yard Truk-mixers.



R. A. Wurgel Photo

NEW SPAN. The Passaic River is now crossed by a new steel bridge on New Jersey Route 25. Erected by the American Bridge Co., the 332.5-foot lift span uses Reliance steel open bridge flooring.

SENTRY. An open abutm[illegible] Great[illegible] near Kettle Fal[illegible], sta[illegible] encircle it, making the approach [illegible]his rai[illegible] sitated by the constr[illegible] of Gra[illegible]

Bureau of Reclamation Photo

GOING UP! Another bucket of concrete goes into Friant Dam on the San Joaquin River in California, as the blocks rise around the steel construction trestle from which the bucket is lowered.

TEAMWORK. Using these Koehring 27-E pavers side by side, the Harrison Engineering & Construction Co. averaged 1,500 feet of 22-foot slab a day on a Louisiana paving job. Photo by Orville J. Ward, Superintendent.

DEFENSE. Falmouth, Mass. An International TD-18 [illegible] wo[illegible] 2-mile grading contract [illegible] spu[illegible] The contract, awarded to L[illegible] o[illegible] ment of [illegible] of

Bureau of Reclamation Photo

PLOP! The 8 cubic yards of concrete being added to a block at the downstream face of Shasta Dam is a mere "drop in the bucket" in the 6,000,000 cubic yards to be placed in this giant structure.

ROCK FILL. Dumping the first wagon of a tandem load of coarse lime rock on the main dam fill [illegible] Cherokee Dam at Jefferson City, Tenn., TVA's $65,000,000 project on the Holston River [illegible] provide power for defense work. The dam will be a concrete gravity and earth structure 6,600 feet long, [illegible] cluding 700-foot dikes, and will contain about 700,000 yards of concrete and 3,000,000 yards of earth.

[illegible]OAD[illegible] [illegible]ntract[illegible]

outmost Great Northern Railroad Bridge e Falls, stands out alone as scrapers proach this railroad relocation was neces- constr of Grand Coulee Dam.

Bureau of Reclamation Photo

RED-HOT. Two riveting students take their first lesson from an instructor at the riveters' school at Grand Coulee Dam where about 60 men are being trained in the skilled business of riveting.

MONSTER. Reaching out a 140-foot boom, this giant Monighan picks up 11 tons of material at once and delivers it to the sand and gravel processing plant for the concrete for Shasta Dam.

SPEED. With this Cedar Rapids crushing and screening plant, powered by a Waukesha 193-hp gasoline engine, the Jefferson County Highway Department, Jefferson, Wis., last year produced 76,987 yards of crushed limestone gravel and 971½ yards of sand gravel for its roads.

er working in typical Cape Cod terrain on a ad spur to connect Camp Edward with North yrne of Dennisport, Mass., called for the move- ds of dirt.

CARRIE NATION. A modern version of the prohibitionist hatchet girl, this Caterpillar was borrowed to destroy $12,000 worth of confiscated liquor in Kansas. A sad and silent throng look on.

OAD WIDENING. The McMahan Construction Co. of Rochester, Ind., used this Trojan ditcher pulled by a TD-40 to cut widening trench next to an old pavement on its 10.53-mile highway tract on Ind. Route 29. The ditcher has three adjustable scarifier teeth, a blade affixed to the frame, and the wheels are raised or lowered by a pair of Blackhawk Power Packers mounted at the rear.

Bureau of Reclamation Photo

A PIPE with a human yardstick. Four of these plate-steel river-control conduits, each 9 feet 2 inches in diameter and about 190 feet long, will be imbedded in the central section of Friant Dam.

NAVAL AIR BASE. One of the important defense projects in the East is the new Naval air base at Norfolk, Va. To handle the 200,000 cubic yards of earth moving, the Virginia Engineering Co. of Norfolk, is using two Carryalls, a Rooter and a D8 with a bulldozer.

The new A-W No. 55 grader.

Hydraulic Control New Grader Feature

One of the features of the new Austin-Western motor grader is its accurately built type of hydraulic control used on larger and more expensive machines, according to the manufacturer, The Austin-Western Road Machinery Co., Aurora, Ill. Known as the No. 55, this new machine is powered by an International 31-hp gasoline engine; weighs approximately 8,000 pounds; and has five speeds forward, ranging up to 14.8 mph, and a reverse speed.

The sturdy mono-rail box-type frame averages 50 pounds to the foot. The scarifier and blade lift are operated by the smooth-working hydraulic control, while side shift and circle reverse are hand-operated from the cab. Other design features include a wide front axle with ample ground clearance to straddle windrows; front wheels spaced to track with rear drivers; rugged draft beams with ball-joint connection; large diameter circle; and heavily braced blade supports.

Standard equipment includes an 8-foot blade, hydraulic wheel brakes, and parking brake. An electric starter, horn, lights, canopy-type cab, 10-foot blade, V-type scarifier and snow plow are optional.

High-Speed Developer For Engineers' Offices

A new developing machine designed to speed up blueprint or black-line print production has recently been announced by the Charles Bruning Co., Inc., 100 Reade St., New York City. Known as the Bruning No. 159 Volumatic Developer, the machine is intended for use with the Bruning No. 75 BW printer. With this combination, it is stated that one operator performs the entire printing and developing operation easily and speedily.

The new developer consists of a separator roll, water roll and a series of bands which carry the developed prints through the drying section. In operating the machine, the sensitized paper and tracings are fed into the machine at the front, where they are exposed in the printer section. The vacuum separator roll at the discharge point of the printer separates the tracings from the exposed prints, allowing the prints to pass automatically to the developing and drying sections of the developer. The tracing is returned to the operator, while the completely developed print is delivered flat and dry at the rear of the machine. The developing section is driven by the printing machine, and is synchronized to operate at exactly the same speed.

A New Light-Weight Convertible Shovel

In the new light-weight ¾-yard convertible shovel-dragline-crane recently announced by the Link-Belt Speeder Corp., 307 No. Michigan Ave., Chicago, Ill., as a companion to the LS-85 heavy-duty ¾-yard machine, all welded steel construction has replaced castings, the power plant is a heavy-duty gasoline or diesel engine with smooth-running roller chain drive, and alloy-steel machine-cut spur gears drive the reverse and drum shafts which turn in heavy bearings.

Known as the Model 75, this new machine has external band clutches which enable the operator to "feel" the load at all times, and all brake bands are readily accessible for adjustment or removal for re-lining. It has a large-diameter turntable and long wide crawlers for extra stability on slopes and in heavy digging. The upper and lower frames are connected by a heavy alloy-steel center quill with a large adjusting nut. A three-piece traction shaft driven by fully enclosed alloy-steel bevel gears transmits full power to the crawlers by means of heavy heat-treated roller chains. The crawler shoes are abrasion-resisting, non-clogging, and lug-driven, with close pin centers to insure smooth action, the manufacturer states. Track adjustment is provided at both ends to maintain alignment and tension.

Controls operated from within the cab permit steering in both directions, either gradual or sharp, regardless of the relative position of the cab and lower base. A positive traction lock, controlled from the cab and engaging in three positions, prevents movement of the crawlers while working, eliminating the necessity for chocks or blocking, it is stated.

Working ranges, clearances and lifting capacities of the Model 75 are given in a new folder, copies of which may be secured direct from the manufacturer.

Painting Concrete Surfaces

The Medusa Products Co., Division of Medusa Portland Cement Co., 1019 Midland Bldg., Cleveland, Ohio, has available a bulletin on its paint for painting concrete, stucco and masonry surfaces. According to the manufacturer, Medusa portland cement paint makes a natural bond to concrete and masonry surfaces because it is made of the same basic materials, and is unaffected by the chemical action of lime and alkalies.

Such items as the preparation of the surface, covering capacity, color selection, mixing, and how to apply are covered in this folder, copies of which may be obtained direct from the manufacturer by mentioning this item.

Crushed Stone Road-Mix With Cut-Back Asphalt

Lambert & George Speed Work on 6.58-Mile Contract On Vt. 15 East of Hardwick; Operate Own Gravel Plant

(*Photo on page 52*)

✦ UNROLLING a 2½-inch compacted blanket of road-mix surface 20 feet wide with minimum delays to traffic, Lambert & George of Montpelier, Vt., completed 6.576 miles of surface with crushed-stone aggregate in fast time last summer. The contract was awarded on the low bid of $73,117.80 which was increased approximately 25 per cent because the Highway Department decided to raise the grade from 3 to 21 inches over most of the work.

Preparation of Grade

The grading of this project was completed two years ago by another contractor and left with a tack coat. Two years of traffic had compacted the grade to a solid base, but it was decided to make some changes in the grade, varying from 3 to 21 inches, which was done with crushed gravel with a maximum 2½-inch stone and the sand screened out. This 3 to 21-inch gravel base course was spread in 3-inch courses, filled with a sand filler and rolled with a 12-ton 3-wheel Hercules roller. Then a prime coat of tar was applied at the rate of 1/3-gallon per square yard to prevent fines being mixed into the 2½-inch top. While the normal width of the road is 20 feet, the curves were all banked and widened up to 40 feet. On the outside of these curves and at the edge of the fills, where cribbing or guard rail was installed, 2 x 10-inch creosoted board curbs with metal drop inlets were erected against which the mixed material was rolled to provide gutters and thereby prevent wash on the slopes.

Spreading, Shooting and Mixing

The surface stone, a white limestone, was purchased from the Swanton Lime Works at Swanton, Vt., and delivered by rail a distance of about 75 miles to convenient sidings at either end of the contract. The stone was spread with a 10-foot Galion stone spreader at one side of the road 8¼ inches thick and then knocked down to 14 feet wide with a Caterpillar No. 11 power grader. The stone, which ran from ⅝ to 1¾-inch, was shot with 0.15-gallon per square yard of MCI cut-back asphalt to prime the stone, and then mixed with one pass of a Galion retread mixer pulled by an International TD-18 diesel tractor. Immediately after this the primed stone, which had worked out to 16 feet wide by the mixing, was shot with 0.75-gallon per square yard of RC No. 4 cut-back asphalt, immediately mixed with two or more passes, as required, of the retread mixer, and then put into shape with the No. 11 power grader.

Between 5 and 6 hours after the last application of the RC-4, rolling was started with a Buffalo-Springfield 5-ton tandem roller. Vermont specifications call for the use of a 3-wheel roller and the contractor had ordered one, but the sudden government order for 3-wheel rollers for airport construction made it necessary to permit the contractor in this case to use the tandem roller for surface rolling. Immediately following this first rolling, the road was opened to traffic and then given a final rolling the next day after a portion of the flux had evaporated from the cut-back and the stone had been partially worked by traffic.

Sealing

Two days after the mixing, a light coat of ¾-inch and smaller chips was cast over the surface with a Burch Chip-It-Over rotary spreader at the rate of 25 to 35 cubic yards per mile of 20-foot road. Traffic works these chips into the surface voids and whips the excess toward the side of the road. Four or five days later the entire surface was given an application of RC-4 at the rate of 0.3-gallon per square yard followed by an application of pea stone at the rate of 80 to 90 yards per mile with the Chip-It-Over spreader. Then the entire road was given a thorough broad rolling with

(*Concluded on page 47*)

C. & E. M. Photo

The first shot of 0.15-gallon per square yard of cut-back asphalt to prime the crushed limestone before the initial mix on Lambert & George's job on Vermont 15.

The new Slusser-McLean dirt-moving scraper.

New Hauling Scraper In 1, 1½-Yard Sizes

The Slusser-McLean Speed Haul scraper for use with all wheel-type and light crawler tractors on shoulder work and narrow excavating jobs, such as channels and ditches, is a complete hauling scraper available in two sizes, of 1 and 1½-cubic yard capacities.

A patented double-drum cable-operated power-control unit is built into the single front wheel and the travel of this wheel furnishes the power to raise and lower the bowl for filling and to control the apron and dumping of the load. All movements of the scraper are controlled through two ropes by the operator from the tractor seat. With one rope he raises and lowers the bowl for filling and lifting the bit out of its cut and with the other he dumps the load and returns the bowl to the filling position.

The depth of spread ranges from nothing to 12 inches, and uniformly deep or shallow cuts can be taken at the operator's will. Since the Speed Haul scraper carries its load completely suspended, it delivers full loads to the dump after each trip, according to the manufacturer. After the bowl is filled and placed in carrying position, the operator can travel at any speed at which the tractor is capable of moving. Thus dirt can be moved economically over long distances.

These scrapers are constructed of high-grade materials throughout. The blades are of high-carbon steel and are reversible; the sheaves are equipped with bronze bearings and the wheels with Timken bearings. Tractors of the two-plow type will handle the 1-yard size of Speed Haul scraper and three-plow tractors, the 1½-yard size.

Further information on these scrapers is contained in a new illustrated bulletin, copies of which may be secured direct from the Slusser-McLean Scraper Co., Sidney, Ohio, by mentioning this item.

Cold Weather Concreting Or Better Concrete Curing

These are two of the subjects discussed in the revised 12-page bulletin on the use of calcium chloride as an admixture or as a surface concrete curing agent. Containing detailed information on the effects and advantages of adding calcium chloride to concrete mixtures, this bulletin is also well illustrated with photographs and charts. Included also are the latest A.S.T.M. specifications for using calcium chloride in dry flake form, as well as in solution, covering the incorporation of the chemical as an admixture and its use as a surface curing agent.

Copies of this interesting bulletin may be secured by interested contractors and engineers without charge by writing direct to the Calcium Chloride Association, 4145 Penobscot Bldg., Detroit, Mich. Ask for Bulletin No. 35.

More Cutting Edge Per Detachable Bit

Detachable bits so designed that a greater area of the cutting edges is located at the extreme outside diameter where it is most needed, providing broad chopping and reaming edges, have been announced by Sullivan Machinery Co., Michigan City, Ind. Sullivan improved detachable bits are made from electric furnace steel, forged, machined, heat-treated and finished to exact gage under automatic control to insure precision and uniformity. This care in manufacture is claimed to result in smaller losses in gage, fewer steel changes, fewer regrinds, elimination of rifling in holes, and no binding or catching of bits.

These bits are made in center-hole and side-hole types, and the rod, fitted with a special rugged acme thread, bottoms into the bit so that the full force of the blow is not centered on the threads. Sullivan bits are made in gages from 1½ to 2¾ inches and the rods in 2-foot changes up to 30 feet.

The Sullivan improved detachable bit.

A new Bulletin 78-G has just been issued by Sullivan, featuring these bits, and will be sent to readers of CONTRACTORS AND ENGINEERS MONTHLY referring to this item.

Wood Access Roads To Texas Army Camp

(*Continued from page 2*)

Wood Roads at Camp Wallace

Shortly after the contract for the construction of barracks, administration buildings and other structures at Camp Wallace was awarded to Dalton & Denholme, heavy winter rains set in in the Houston-Galveston area, making the camp site a sea of mud. In order to reach the camp site from Route 6 it was necesstry to build four wooden roads from 3,500 to 4,000 feet long. The original shell road, which gave access to the camp, failed and it was impossible to take any motor vehicles in to the site. Two of the wood roads were built first and a heavy rain floated them so that it was necessary to stake them down with 2 x 4's. Before this was done one of the roads became very irregular in alignment.

These four new wood roads, the only means of entering the camp from Route 6 at present, consist of 3 x 10 and 3 x 12 longitudinal mud sills over which are laid 3 x 10's for ties. Then the track on which vehicles drive is laid longitudinally and consists of three 3 x 10's with 4 x 6's to form inner guard rails. These roads are now staked and spiked with 2 x 4's every 15 feet.

Over 200,000 tons of oyster shell have been ordered by Army authorities for shell roads throughout the camp and many of these later will be topped with concrete. It is planned that the concrete access roads to be built by the state will be 22-foot concrete pavement, constructed under PRA supervision on a base of clay compacted at optimum moisture with sheepsfoot rollers and covered with 12 inches of selected material, probably a loam, to carry the 8-6-8-inch concrete pavement.

Award Presentation At Indiana Letting

(*Photo on page 52*)

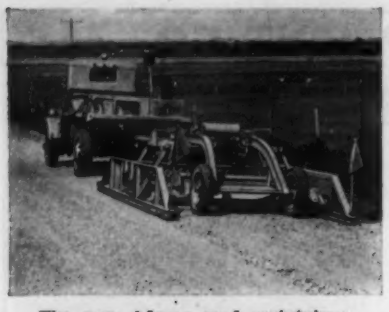
✦ THE mahogany plaque bearing a suitably inscribed silver plate, emblematic of the Central Section Award of CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for 1940, was formally presented to G. H. Spears, Superintendent of the Grace Construction & Supply Co., Fort Wayne, Indiana, at an Indiana highway-contract letting on March 18. The presentation was made by James D. Adams, Chairman of the Indian State Highway Commission, before a gathering of several hundred members of the road-building industry.

Mr. Spears won the Central Section Award for his care in the preservation of existing trees and shrubs, dressing of borrow pits and other areas at no expense to the state, and his unusual cooperation with the state highway engineers on a 21-mile highway grading contract on Route 13 near Elwood, Ind. His outstanding work was judged to be the greatest contribution by a contractor to roadside development in the central section of the United States in 1940.

As Mr. Spears was unable to be present at the Associated General Contractors of America Convention in Houston, Texas, when all of the 1940 Awards were made, Indiana Highway Constructors, Inc., the Indiana highway contractors branch of the AGC, and the magazine *Construction Digest* arranged for the presentation at this Indiana letting.

New Browning Dealer

Announcement has been made by the Browning Crane & Shovel Co., Cleveland, Ohio, of the appointment of Harry W. Faunt Le Roy, Calvert Bldg., Baltimore, Md., as exclusive distributor for Browning cranes and shovels in the state of Maryland and the southern section of Delaware. Mr. Faunt Le Roy, who has had many years' experience in manufacturing material-handling equipment, will also take care of any service requirements of Browning users in that area.



The new Adams road maintainer.

Multiple-Blade Unit For Road Maintenance

For the maintenance of gravel, stone or dirt roads or shoulders, the J. D. Adams Co., Indianapolis, Ind., has announced a new road maintainer known as the No. 8. This multiple-blade machine operates at speeds up to 15 mph, according to the manufacturer, leaving no windrow to endanger traffic. It may be pulled by 1½-ton or larger trucks, or by 45-hp pneumatic-tired tractors.

Among the features of the new Adams No. 8 is the blade control which automatically adjusts the cutting action of the blades according to the load and resistance against the blades. This control requires no attention after it is once set for the results desired, thus leaving the operator free to operate the truck or tractor. The blade structure rides on skids, thus making it free of bounce, and the machine leaves a finished surface in one passage, eliminating the necessity for a second trip to spread the windrow. Oversize stones can be removed by adjusting the spreader blade to prevent the large stones from passing underneath the blades and attaching a stone-thrower device which deposits all oversize material on the shoulders.

Further information on the Adams No. 8 road maintainer is contained in a new bulletin which may be secured by those interested direct from the company. Ask for Form 4011.

Use of Cotton Quilts For Curing Concrete

The result of the use of approximately 90,000 cotton quilts costing about $400,000 by some twenty-three state highway departments, which were furnished with the curing quilts by the Federal Public Roads Administration, was favorable to this method of curing and now many states specify the use of cotton quilts for curing concrete roads.

National Brand cotton quilts, a product of National Automotive Fibres, Inc., Highway Materials Department, Little Falls, N.Y., are manufactured with covers of either new burlap or osnaburg, and have a filler of cotton batting of approved weights, stitched with parallel rows of strong thread to meet all state highway department requirements. These quilts are made in all sizes desired, with or without flaps or spools and with fabrics of specified weights. Quilts of the osnaburg type, in actual use on concrete paving jobs, have stood up well for over 100 applications and removals, giving them a life four times that of ordinary burlap sheets when wet and used for curing, it is reported.

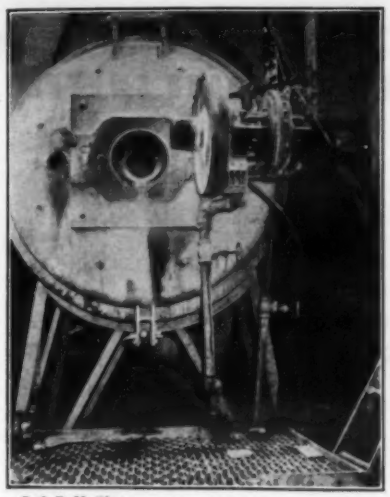
The application of National Brand cotton quilts on the fresh concrete requires the labor of two men. Some highway departments require them to be placed longitudinally while others prefer transversely. In most instances, unless extremely high temperatures are encountered, one thorough wetting is all that is necessary to do a complete curing job in 72 hours. It is stated that these quilts retain a maximum of moisture and unlike ordinary burlap sheets, straw or hay, do not dry out nor require continuous sprinkling. This feature alone saves considerable labor and water, both of which are important on any highway project.

Full details and literature on National Brand cotton quilts will be furnished free on request.

New Booklet on Road Bases

A completely revised and greatly enlarged edition of the booklet "Better Bases for Better Roads" has just been issued by the Solvay Sales Corp., 40 Rector St., New York City. This new edition contains new data, new specifications and new information on base construction and maintenance, as well as information on calcium chloride as a stabilizing agent. It also includes such information as A.A.S.H.O. specifications, recent Public Roads Administration test data, and a comparison of roller versus shrinkage compaction as determined by shear tests.

Copies of this booklet may be secured by contractors and highway engineers direct from Solvay Sales Corp.



C. & E. M. Photo
The Ray fuel-oil burner which furnishes heat for the 15-foot Simplicity System drier.

Asphalt Plant Serves Virginia Road Jobs

(*Continued from page* 11)

nished steam for operating the asphalt pump, jacketing the lines, driving the fuel-oil atomizer for the drier, and heating the asphalt tanks as well as operating the steam pistons on the gates beneath the pug mill. A Deming hand pump was used to deliver pond water under pressure to the boiler.

The entire plant was driven by two 100-hp International UD-18 diesel engines, one driving the mixer and the other driving the remainder of the plant. A fuel-oil tank of 6,000-gallons capacity supplied fuel oil for operating the diesel engines and for the torch heating the drier. A small overflow tank was located near the engines to receive the excess oil not used for power.

Weighing and Mixing

The aggregates and asphalt were weighed in separate buckets, each equipped with Kron dial scales. The 2½-ton batches, consisting of 93½ per cent sand and 6½ per cent Texaco asphalt of 85 to 100 penetration, were mixed for 1 minute and 15 seconds by an Iroquois pug mill.

The plant capacity was 60 tons per hour and its average production, 500 tons per 10-hour day.

Personnel

The plant was operated by a superintendent and eight men, with the work divided as follows: one man directing and dumping the sand and gravel trucks; one man operating the tractor; one crane man; the mixer operator who weighed and dumped the batches; one drier man; one grease monkey; and two laborers.

E. Lee Pratt was Superintendent of the plant at Providence Forge, Va., owned and operated by Asphalt Paving Service, Inc. of Richmond, Va., of which W. A. Penick and A. B. Gay are the principals.

New Trailer Permits Larger Load Weights

A recent innovation in the heavy-duty trailer field is the Rocking Beam trailer announced by Rogers Bros. Corp., Albion, Penna. On each side at the rear of the trailer is a welded box section which rocks lengthwise of the frame. At either end of each section is a short non-tapering axle which carries a wheel on two heavy-duty Timken bearings. This axle is cambered to fit the normal crown of the road.

According to the manufacturer, these Type T Rocking Beam trailers are popular in states wherein the allowable load is based on the number of different axle planes. In these states Type H trailers, with four wheels in line, are regarded as single-axle rear trailers but Type T trailers are rated as two-axle rear trailers and are therefore acceptable for carrying heavier loads. Also, the design of the Type T permits building units only 8 feet wide in capacities from 15 to 35 tons, whereas the cross-sections of tires restricts standard Type H trailers of this width to 25 tons.

Further information and a complete description may be obtained direct from the manufacturer by mentioning this item.

Bulletin Describes Wood Preservative, Weed Killer

Kolineum, a highly refined creosote used as a wood preservative, insecticide and a weed killer, is described in Form TD-11 recently published by Koppers Co., Tar & Chemical Division, Pittsburgh, Penna.

Directions are given for preserving wood by dipping, brushing or spraying with Kolineum and also for using it as an insecticide and a weed killer.

Wood-Sole Shoes and Sandals for Workmen

The line of wood-sole safety and special workmen's shoes in a wide variety of styles for many uses, and including two types of paver's sandals to protect the feet of workers in asphalt as well as to protect the paving itself, is described and illustrated in a new booklet issued by the F. J. Stahmer Shoe Co., Davenport, Iowa.

The pavers' sandals are constructed with a recess cut in the sole into which the heel of the wearer's shoe fits to prevent slipping. They fit over any leather work shoes, have an adjustable strap to fit high or low insteps, and are available with or without spikes.

Copies of this Davenport wood-sole shoe manual may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

The new Model U Briggs & Stratton 1-hp engine.

New Compact Engines For Small Equipment

Two additions have been announced in the line of small gasoline motors made by the Briggs & Stratton Corp., Milwaukee, Wis. Model U is a compact 1-hp unit with a speed range of 2,200 to 3,200 rpm, having a 2 x 2-inch bore and stroke with a piston displacement of 6.28 cubic inches. A 5-pint fuel tank is mounted vertically beside the cylinder block rather than on top, which reduces the overall height of the unit. A specially designed suction-type carburetor is used to draw the fuel from the tank. In addition to the standard model, it is available with gear reductions of 6 to 1 and 2 to 1.

The Model N motor has the same piston displacement as the U, but develops up to 2 hp at 4,000 rpm under test, with a speed range of 2,600 to 4,000 rpm. A float-feed type of carburetor is used and is fed by a gravity system from the 2-quart fuel tank mounted above the cylinder block. The Model N is available in special types incorporating gear reductions of 6 to 1 and 2 to 1, and direct mounting crankcase, machined and tapped with ball bearings on the drive side.

Both models are of air-cooled 4-cycle L-head design, equipped with a patented high-tension magneto built into the flywheel. A pump supplies lubrication to all moving parts. The connecting rods and pistons are made of durable aluminum alloy to reduce weight and increase operating efficiency. An adjustable pneumatic type of governor regulates the motor speed.

Detailed specification sheets are available from the manufacturer on request by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Heavy-Duty Line Of Hydraulic Jacks

To supplement its line of Simplex lever and screw jacks, Templeton, Kenly & Co., 1020 So. Central Ave., Chicago, Ill., has recently announced a line of heavy-duty hydraulic jacks. Made in 3, 5, 8, 12 and 20-ton capacity sizes, these jacks have a number of features, including neoprene oil-resistant seals, pressure-tested malleable-iron top nut and base, a machine-ground ram, a fully lapped cylinder, ball-type valves, needle-type load release, a center ram for proper balance, and a convenient carrying handle.

Operating features common to all models include low closed height, high raised height, light weight, leak-proof design, and provision for operation in either a vertical or a horizontal position. Ruggedly constructed for heavy duty, these jacks are tested to 1½ times their rated capacity to insure satisfactory operation and safety for operator and load, according to the manufacturer.

Bulletin H.D.-41 illustrating and describing this new line of hydraulic jacks may be secured by those interested direct from the manufacturer by mentioning this magazine.

Protection of Windrows On Stabilized Road Jobs

Sisalkraft blankets, which have been used for curing millions of yards of concrete pavement in every section of the country, are now serving road builders in a new capacity, that of protecting windrows from bad weather on the various types of stabilized and road-mix highway jobs.

These blankets are made of Orange Label Sisalkraft specially treated to resist shrinkage, scuffing and soil rot, and are reinforced with rough sisal fibres for strength. They are available in any size for any job, although the standard is 60 feet long, in widths from 8.5 to 30 feet. Rolls of Sisalkraft in 3, 4, 5, 6 and 7-foot widths are also available.

An illustrated bulletin, recently issued by the Sisalkraft Co., 205 W. Wacker Drive, Chicago, Ill., describes these blankets in detail and illustrates their use for curing concrete curb and gutters, for covering machinery, motors and equipment, and for stockpile covers, as well as for protecting windrows from sudden rain, or over-night. Copies of this catalog may be secured direct from the manufacturer by mentioning this item.

Electric-Tool Catalog

Nineteen new models of high-frequency electric tools are shown in the new Thor high-frequency electric-tool catalog, 1941 edition, recently issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. These new models consist of balancers, drills, grinders, nut setters, the Pix-Up Finder, polishers, rubbers, sanders and screw drivers.

Considerably larger than the previous edition, the No. 61 contains a complete section of balancers, is fully illustrated by tool and action pictures, and gives full specifications on all Thor high-frequency electric tools. Copies of this catalog may be obtained direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Annual Treatment Of Gravel Roads

Maine Has Regular Program Of Tar Surface Treatment Rotated Over 5,000 Miles Of State's Highways

✦ THE continuing program of tar surface-treatment of the 5,000 miles of gravel roads in the 7,300 miles of the state and state-aid highway system in Maine has resulted in building up a bituminous blanket of considerable strength and thickness on most of these roads. In many sections the blanket is not readily distinguishable from a high-grade road-mix surface while in others, where the gravel is not as well graded, the surfacing breaks up between treatments. The treatment, received at intervals of 3 to 5 years as required, consists of from 0.1 to 0.2 gallon per square yard of 23-viscosity tar measured at 50 degrees C.

Maintenance District Organization

For maintenance the state is divided into four General Districts with four General Supervisors who oversee work on both state-aid construction and maintenance operations. Under these are forty Supervisor Districts which handle both maintenance and secondary highway construction.

For ease in handling the bituminous material the state is divided into five Tar Purchasing Areas so arranged that delivery can be made by tank cars at convenient freight points to minimize hauling costs. Annual bids are taken for the delivery of tar within each of these areas and for 1940, the Barrett Co. was low in three of the areas and the Koppers Co. in two areas. The total tar requirement for 1940 was 9,000,000 gallons.

Applying the Tar

The tar is applied by special crews, consisting of 22 men each, which go out with the forty-one Kinney distributors and with their own camp equipment and cook. A few of them also have 1,200-gallon semi-trailer supply trucks to make it possible to haul extra-long distances and still keep the distributors busy. The program is so planned to take tar direct from the tank cars on sidings and to minimize demurrage charges, as even "the best laid plans" are completely disrupted when long spells of rainy weather occur in the spring and early summer when most of this program is undertaken. The tar is shipped in jacketed tank cars, which usually maintain the temperature sufficiently high for application but if necessary the temperature is boosted in the distributors. Only a negligible quantity of tar is hauled direct from the plants of the material contractors.

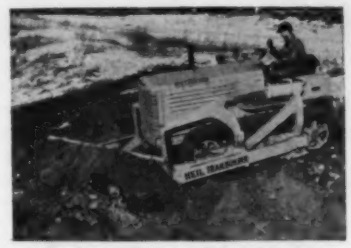
Sanding the Application

In order to build up the bituminous mat, and also to cause the minimum inconvenience to traffic, the application of tar is immediately covered by hand with sand from small stockpiles located 20 to 25 feet apart on both sides of the road being sanded. The sanded application is then bladed with a multiple-blade drag to smooth out the irregularities, and this mulch is then resanded by rotary sanders attached to the tailboards of dump trucks which are supplied with sand from conveniently located stockpiles where small power loaders are maintained to speed up the restocking of the sand in the trucks.

The resurfacing program as well as general maintenance of all state and state-aid roads in Maine is in charge of John Church, Maintenance Engineer, State Highway Commission, of which Lucius D. Barrows is Chief Engineer.

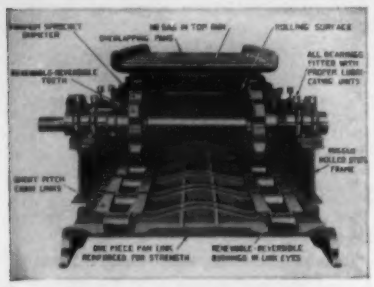
New Trailbuilder

With a cutting width of 98 inches when in angling position, the new Model HT-60 Heil trailbuilder permits a wide cut which helps to cut down 'dozing time. This trailbuilder, shown in the illustration mounted on a Model DD Cletrac in operation leveling off turf, has a maximum blade lift of 39½ inches above the ground line and a maximum blade drop below ground line of 24½ inches.



The Model H-60 Heil Trailbuilder.

Like all trailbuilders made by the Heil Co., Milwaukee, Wis., this unit is hydraulic in operation, employing large-diameter hydraulic cylinders which permit the use of low hydraulic operating pressure. It has a blade height of 30 inches, which makes possible pushing high-packed loads without any loss of the load through the dirt's climbing over the blade.



The new Robins apron feeder.

Steel Apron Feeder For Large Crushers

The handling of large stone from quarries and ledge excavations and feeding them uniformly to a primary crusher is an important problem on many construction projects. The Robins-Oro manganese-steel apron feeder was developed to handle this type of service. This apron feeder, made by Robins Conveying Belt Co., Passaic, N. J., consists of a series of double-beaded overlapping and interlocking pans, with vertical reinforced side flanges, the under sides of which are heavily ribbed to withstand impact and pressure. Robins-Oro apron feeder pans are made in four standard pitches of 6, 9, 12, and 15 inches. The shorter pitches allow for the proper design and installation where headroom is limited.

The vertical overlapping side flanges prevent spillage, and as the edges of these flanges are beaded they give a flat surface which becomes the supporting surface on the return strand. Leakage is minimized by raised flat surfaces just inside and directly under the skirtboard edge which form a continuous sealing strip.

Bulletin 112 describes and illustrates this apron feeder, as well as giving all detail dimensions for all sizes and pitches and the motor horsepower required for the drive. Copies of the bulletin may be secured by writing to the manufacturer and mentioning this item.

A New Curing Paper For Concrete Paving

A new low-priced concrete curing paper, known as Wovencure, which has been tested and approved for use by many state highway departments throughout the country, was developed last year, since which time it has been used in practically all parts of the country with satisfactory results, it is reported.

Wovencure is a laminated northern kraft paper of high tensile and bursting strengths, two sheets of which sandwich two vanes of high-melting-point asphalt, providing waterproof and air-tight qualities, and is reinforced with tough jute fibres in an average of ½ x ½-inch mesh. It is reported that Wovencure cemented into mats for curing 11 and 12-foot pavement slab in Ohio was used an average of 35 times during the season.

Other purposes for which Wovencure can be used are as covering for stockpiles, machinery, cement storage protection, and for enclosing winter work. Complete information, samples and prices on Wovencure may be secured by interested contractors and engineers direct from the L. K. Lippert Co., 297 South High St., Columbus, Ohio, by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Concrete Culverts

In a new 54-page booklet, "Concrete Culverts and Conduits" recently published by the Portland Cement Association, particular attention is given to the design requirements of the practical engineer. Fundamental theory is concisely treated, emphasis being directed to modern methods by which drainage structures are economically chosen, properly located and correctly designed.

Starting logically with the determination of maximum run-off, the engineer is taken step-by-step through pertinent discussions on the selection of culvert or conduit types, design loads, short-cut design procedures, and detailed examples. New and valuable data include the results of extended analyses in the form of coefficients for the design of both box-culvert and sewer sections. Typical designs are also presented to meet a wide range of field conditions, and the text is well illustrated with photos and diagrams.

State, county and township highway engineers may secure copies of this booklet free by writing direct to the Portland Cement Association, 33 West Grand Ave., Chicago, Ill., and mentioning this item.

Roadsides of Future Must Be Economical

(*Continued from page 4*)

needed properly developed defense highways and the super-highways which are the order of the day for adequate transportation service, there may come a day when the sword will fall, and the highway department bird sanctuaries and large recreation areas will be without any maintenance funds.

This is but a word of caution. There are unlimited opportunities for the landscape engineer to apply his art and science on the slopes of cuts in rolling and hilly country, at intersections, cloverleafs and traffic circles in order to increase safety and reduce erosion, and at selected places where historic, scenic or recreational areas of limited size may be developed and maintained at small expense.

We realize full well that well-meaning garden clubs and thoughtful civic-minded, or sometimes politically minded, individuals will offer land free for development as roadside parks. Diplomatic restraint must be exercised to avoid the acceptance of this land where the costs of maintenance will increase the state highway maintenance expenditures slowly but surely to the breaking point. If the group or the individual can be persuaded to endow the park for its maintenance, it might be accepted and an appreciative bronze tablet should be erected to the donor and to the landscape engineer who arranged for the endowment.

Friction Material for Clutches and Brakes

Velvetouch bi-metallic friction material for use in friction-type clutches and brakes is a new friction material consisting of a combination of various powdered metals such as copper, tin and lead, compressed, sintered and welded to a solid metal backing for support. This material is available for all types of standard trucks, tractors and construction machinery to replace conventional friction materials.

A new 40-page catalog, describing Velvetouch and containing many illustrations of earth-moving and construction machines which are equipped with it, as well as many industrial installations, has recently been issued by the S. K. Wellman Co., 1381 E. 48th St., Cleveland, Ohio. Copies may be secured by interested contractors and engineers direct from that company by mentioning this item.

Construction Equipment Catalog Issued for 1941

In accordance with its yearly custom, the Construction Machinery Co., Waterloo, Iowa, has just issued a new catalog for the coming construction season. Featuring more new equipment, more improvements in its line of construction machinery, more and larger pictures, and useful and easy-to-read information, the new CMC catalog is divided into seven sections, covering big job mixers up to 28-S; small mixers in 3, 3½ and 5-S sizes; plaster, mortar and bituminous mixers; batching and placing equipment; hoists; Dual Prime pumps; and power saws.

Copies of this new 1941 56-page catalog entitled "Construction Equipment" may be secured by interested contractors and state, county and township highway engineers direct from the manufacturer by referring to this item.

Trailer Train for Hauling Aggregates

The Cooper Supply Co., Detroit, Mich., which deals in truck-mixed concrete, saves considerable money on its haulage problems by using two Fruehauf trailers in a train with a total capacity of 27 cubic yards. Twelve yards are carried in a tandem semi-trailer in front and 15 yards in the 8-wheel rear trailer. This trailer train is used to haul sand and gravel from the yard for use in the company's concrete mixer trucks. The material is dumped into the pit, carried by conveyors to overhead bins and metered into the mixers on the trucks by controlled chutes.

The trailers are the hand-operated bottom-dump type, equipped with 16 x 4½-inch Westinghouse air brakes and are mounted on 24 9.00 x 20 tires. The Cooper Supply Co. states that these units replace a straight truck operation, thereby saving considerable on the cost of hauling as well as preventing delays in the schedule of the truck mixers.

All contractors on the relocation of U. S.-Maryland Route 40 elected to use the Hunt process of curing.

Concrete Paving on Maryland Relocation

(*Continued from page* 15)

ber was used for the premoulded filler and the joints were tooled by hand. On the expansion joints, immediately after the final passage of the longitudinal finishing machine, the metal cap was removed from the top of the premoulded filler and a ¾-inch wood strip, cut to a depth equal to that of the top of the filler below the surface, was inserted in the opening. This strip was held in place on the filler by wire nails extending from the strip and which were forced into the rubber. A wood float was used to force the concrete to the strip and a straight-edge 4 feet long and notched to fit snugly over the wood strip was used to check the surface. As soon as the condition of the concrete permitted, the joint was tooled, using the wooden strip for a guide. This method insured the minimum width of joint opening.

On the contraction joints, two methods were used. One involved a dowel assembly which had a ¼-inch plate 2½ inches deep tack-welded to the top of the dowels. This put the top of the plate ½ inch below the surface of the concrete and no tooling was required. The resulting crack over the plate is slightly irregular but provides a smooth-riding surface. No excessive spalling has occurred at the joint since being subjected to traffic.

The other method used a dowel assembly without a plate and over which a dummy joint 2 inches deep was cut by a hand-operated tool. In the resulting opening, a ¼-inch metal strip 2 inches deep was inserted and used as a guide for the edging. This cutter was carried on the back of the longitudinal finishing machine, as were the metal filler strips.

Curing

All the contractors elected to use the Hunt process of curing, although burlap, paper, calcium chloride, cotton mats or wet earth were permitted under the specifications. It was required, however, that sufficient burlap or paper be kept on hand to protect newly laid pavement from rain. The bituminous curing was applied rapidly, and there has been very little checking of any of the slab, and no scaling.

A modulus of rupture of 500 pounds was required before the pavement could be opened to traffic. The beams were cast in metal moulds with removable sides, 6 inches x 6 inches x 4 feet, and furnished by the Maryland State Roads Commission. It was required that the beams be cured identically with the slab. The beams were broken in a beam tester made by the American Beam Tester Co. No difficulty was experienced in attaining the 500 pounds in seven days during the summer, but the lower air temperatures of autumn stepped up the time to from 12 to 16 days.

Shoulders

Excavation for the gravel shoulders was done by blade graders, the gravel dumped from trucks on to the grade, and the blade graders were then used to shape it to a typical section. Two applications of calcium chloride of one pound per square yard were required, one pound upon completion of the shoulder and the second when the surface showed signs of dryness.

The scraper equipment used for the excavation operations was also used for the preparation of the park area to receive the top soil. On the Langenfelder contracts, the top soil was placed by scrapers and leveled with a bulldozer. On the other contracts the top soil was loaded into trucks, dumped on the grade, and spread by blade graders.

Personnel

This complete relocation of U. S. 40 in Maryland, extending from Baltimore to the Delaware state line, was opened to traffic in December, 1940, although a section of 2 miles between Northeast and Beacon Hill has not been completed and the bridge carrying east-bound traffic over Little Elk Creek will not be finished until this spring. This requires single-lane traffic for the 2 miles of unpaved section and at the Elk Creek Crossing.

The Maryland State Roads Commission is headed by Major Ezra B. Whitman, Chairman, and Commissioners P. W. Webb and W. Frank Thomas. Wilson T. Ballard is Chief Engineer.

The best defense against costly delays through break-down of equipment on defense construction jobs is regular and proper lubrication.

Terracing with an A-C Speed Patrol.

County Graders Used For Terracing Work

Ordinarily county road officials are not concerned with terracing, except where county graders and tractors might be rented for this purpose. Small motor patrols are being used for this type of work and are building ½ mile of terrace per day at a total operating cost of about $10.00. This is interesting news to county officials when one realizes that private terracing contractors with heavy equipment charge from $35 to $50 per mile of terrace.

County officials in Missouri have been quick to realize that, by making a nominal charge for the use of county equipment for this work, it will be possible for many of them to purchase patrols for road maintenance and light construction work and carry at least a part of the cost by renting them for terracing. Thus, many counties which have had to do without this type of equipment are now placed in the position of being able to secure the right type of light motorized maintenance equipment without placing an undue burden on county tax funds.

In Callaway County, Mo., Harold Slusher, County Agent, is using a standard Allis-Chalmers W-Speed Patrol which is a 6,000-pound motor patrol with a 120-inch wheelbase and a 10-foot moldboard. It is reported that the short turning radius and ease with which the machine is maneuvered adapt it particularly to this type of work.

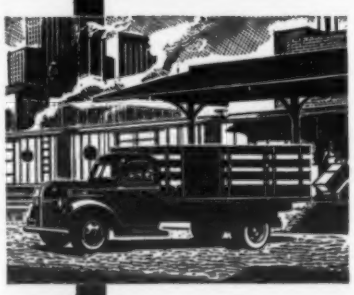
Waterproof Joints For Concrete Roads

The problem of a waterproof expansion joint which will not lose its effectiveness through the extrusion of the material or the filling up of the space between the non-expanding joint filler and the pavement with sand and dirt is still worrying many highway engineers. Subgrades must be well drained to prevent pocketing of water beneath a pavement and consequent "pumping" of the water at joints as traffic passes over it. Of great importance is the waterproof and adhesive quality of the expansion-joint material itself.

A very elastic material which comes prepared in containers, can be heated and poured into crevices or expansion joints, and is claimed to remain plastic even under freezing conditions, has been developed by Servicised Products Corp., 6051 West 65th St., Chicago, Ill. It is made also in pre-formed sealing strips of various types, ready for insertion, and reinforced with metal netting to aid it in retaining its shape.

This Para-Plastic is used effectively to form a self-adjusting joint with ribs which can be extended as the pavement contracts as much as 25 to 30 per cent, thus keeping the crevice watertight even though the joint or filler strips may be entirely separated from the walls of the concrete. This same type of joint, with wedges which are cast in the concrete, is made also of sponge rubber with either sponge rubber or Para-Plastic ribs. The board or filler strip of this particular joint is only surface-treated for waterproofing, but because of its construction it is claimed to be waterproofing in character and free from moisture absorption.

A complete discussion of the various steps in developing a waterproof expansion and contraction joint for concrete roads will be furnished promptly on request by the manufacturer.



Equipment Dealer Holds Open House

A total of 2,342 registrations at the annual Get-Together of the H. O. Penn Machinery Co., Inc., New York City, indicates the interest in new construction and road-building equipment of state, county and municipal officials and contractors from communities in New York, New Jersey, Pennsylvania and Connecticut. The affair began with a special pre-view for executives of contracting companies and municipal officials on Friday night, March 14, and the show continued all day Saturday, March 15.

Among the features of the affair were a complete demonstration truck showing all the vital working parts of a Caterpillar tractor, and movies of Bucyrus-Erie power shovels, backhoes and draglines tackling big dirt-moving jobs, and of Caterpillar tractors as power units for LeTourneau and LaPlant-Choate earth-moving equipment at work constructing and maintaining roads all over the world. On display were the new T-7 Trackson Traxcavator mounted on a Caterpillar diesel tractor; Smith truck and trailer concrete mixers, the new Heltzel steel road forms, Huber road rollers, three models of Beach saw rigs, Barco gasoline hammers, Thor pneumatic tools, the Marlow line of self-priming centrifugal pumps, and other equipment such as motor graders, compressors, spreaders and pavers.

Bulletin on Earth Drills

The Buda-Hubron earth drill is 40 times as fast as the hand method and can dig a 6-foot hole in 3 minutes or a 20-foot hole in 20 minutes, according to The Buda Co., Harvey, Ill. It can dig through hardpan, clay, and impervious material; the size of the hole is uniform and clean-cut so that it can be used as the form for concrete foundations, and it can dig holes up to 50 feet in depth and up to 42 inches in diameter.

A new bulletin, No. 1019, recently issued by this company describes this earth drill in detail, contains statements by satisfied users, and is illustrated with action photographs of its many applications. Copies may be obtained direct from the manufacturer by mentioning this item.

Correcting Erosion On Louisiana Route

Roadside Development Job on U. S. 80, Awarded To Glassell, Improves Main Southern Highway

(*Photos on page 4*)

✦ ON a 3.826-mile roadside development job on U. S. 80 in Ouachita Parish, La., awarded to the Glassell General Construction Co. of Shreveport, La., this contractor's unusual cooperation with the engineers of the Louisiana Department of Highways and his excellent execution of the work won for him Honorable Mention for the Southern Section in CONTRACTORS AND ENGINEERS MONTHLY's Roadside Development Awards for 1940.

The soil on this project, which is located on the Cheniere-Calhoun Highway about 7 miles west of Monroe, is loose and sandy, with a small amount of clay, and is generally typical of the easily eroded soils found in the hill sections of northern Louisiana. On the original construction of this concrete highway a few years ago, no attention was given to the roadside areas beyond the ditches. The shoulders were generally narrow, the ditches close to the traveled way, with erosion very prevalent in the ditches and on the backslopes.

The main work items in this contract included approximately 32,000 cubic yards of excavation; 50,000 square yards of slab sodding; 6,000 square yards of grouted native-stone ditch lining placed on steep grades and run-offs where slab sod would not hold; 93,000 square yards of strip sodding placed on the shoulders and front slopes in continuous rows 12 inches apart; selective thinning of native trees and pruning of those which were to remain; the planting of 283 native trees of flowering types and 291 shrubs; and the construction of a small roadside park. There were other items, such as clearing, grubbing, rebuilding fences, extension of culverts and surface dressing. Work began in December, 1939, and the project was accepted in August, 1940.

Weather No Help

From the very start of the work the contractor was hampered by severe weather conditions and many delays resulted. The months of January, February and March, 1940, brought to Louisiana some of the most severely cold weather occurring in many years. Sleet and snow storms in January and February were followed by excessive rains later in the spring and continuing until June.

Through all of this the contractor showed exceptional patience and care in reshaping the parts of the project which were damaged by the heavy rains. On more than one occasion when sod was ready to be placed, the rains came and considerable repair work was necessary before sodding could proceed.

Improvements

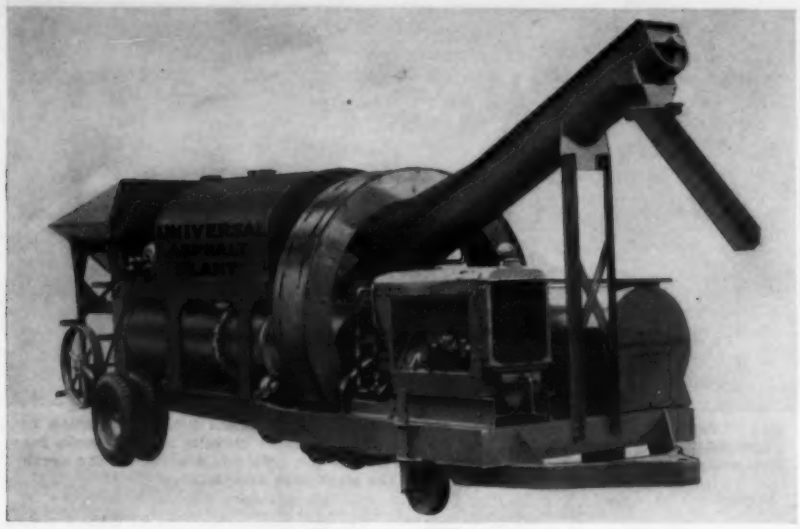
This highway has many curves. Since the original right-of-way was too narrow in several places to flatten the backslopes properly for increased sight distance, additional rights-of-way were secured where necessary. A few backslopes were badly caved in due to seepage which created a "puddled" condition.

One of the reasons Glassell received Honorable Mention for the Southern Section in CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for 1940 was his care in preserving native trees on the job. This is a scene on the north side of the highway after the work was completed.

To hasten excavation as well as to obtain better conditioned backslopes in these cases, the wet soil was dug out and piled nearby in order to dry it out. Later it was replaced where needed.

On the steeper grades or where excessive washing had previously taken place, native-stone lining was used instead of sod. Previous roadside work in this sec-

(*Concluded on page 43*)



A new portable asphalt plant.

New Portable Plant For Bituminous Work

A new portable asphalt plant for use in the maintenance and repair of streets and highways, for paving secondary roads and airport runways, for road-widening jobs and for producing hot patch material has recently been announced by the Universal Crusher Co., 620 C Ave. W., Cedar Rapids, Iowa. This Universal Twin Dryer portable plant has produced up to 42 tons of mixed asphalt an hour, using 11 gallons of MC-2 asphaltic road oil to one ton of aggregates, it is reported. The specifications on this test job called for 30 to 40 per cent of ¼ to ¾-inch gravel and 60 to 70 per cent of ¼-inch-minus sand. The 230-gallon fuel tank supplying the drier burners was filled with distillate costing 6½ cents a gallon only once in the five days of the test run, and only 75 gallons of gasoline for power was used in the 5-day period.

The Universal Twin Dryer has a retractable trailer hitch so that it can be towed by truck or tractor. This is pushed under the frame, out of the way, when not in use. The plant is supplied with materials by conveyor or fed directly from a bin. It has a twin hopper from which material is measured by mechanical feeder to twin driers, sand to one hopper and gravel to the other. These rotary driers are heated by oil-fired burners, and the heat which escapes from the driers is utilized to heat the asphalt in the 700-gallon tank above the driers.

From the driers the material is elevated by the space-saving Rotovator to the screw pugmill. The tumbling and discharge action aerates the material, releasing steam and resulting in a drier material. Hot oil is added in the pugmill and the agitator screws thoroughly cut, mix and blend the material, at the same time conveying it to a swivel chute for convenient truck loading.

The Twin Dryer plant is ruggedly constructed but so compact that it is only 9 feet 6 inches wide, less than 30 feet long overall, 11 feet 2 inches high and weighs 11 tons. The rear wheels are dual-pneumatic-tired.

A new bulletin, No. 57, giving further details on the Universal Twin Dryer portable asphalt plant is now available to interested contractors and state and county highway engineers upon request direct to the manufacturer.

Concrete Paver Catalog

The Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., which this year is celebrating its 50th Anniversary, has issued a new 1941 concrete road paver catalog describing both the Rex 34-E Duomatic and the Rex 27-E Pavemaster. Both machines are described in considerable detail; specifications and working drawings are included; and there are many photographs showing the machines at work on various construction jobs and also depicting certain construction features.

Copies of this bulletin, No. 378, may be obtained by those interested direct from the manufacturer by mentioning this item.

Features of Mower For Roadside Work

A roadside mower which has a wide operating range of the hydraulic-controlled cutter bar, from a free floating horizontal position on the ground surface to any other operating position within a radius of 180 degrees straight up or down, is described in Bulletin RM-1 issued by The Burch Corp., Crestline, Ohio. This Rogers Do-All highway mower has 22 inches maximum clearance under the driving mechanism to prevent clogging when passing over cut weeds or other growth.

There is no pitman drive on the cutter bar as the knife is actuated by a bronze driving rod which is always in direct line at all operating positions of the bar. The driving rod is equipped with rubber shock absorbers to protect the driving mechanism should the knife encounter an object which it cannot cut.

The weight of the cutter bar is carried on a hydraulic oil cushion, and the bar can be stopped and held at any desired position. The inner shoe can be raised from the ground and carried at any desired operating height while the outer end of the cutter bar can be released to float or follow the contour of the road shoulder or wall of a drainage ditch. A hinge release permits the cutter bar to break back 90 degrees, or parallel with the line of travel, when it strikes a hidden obstruction. It can be completely folded for transport when moving the mower from one place to another. The cutter bar is in plain view of the operator who can see the operation of the knife at all times and controls it with hydraulic power-control levers within easy reach.

The Rogers Do-All highway mower.

A copy of Bulletin RM-1 will be furnished free on request.

County Road Improved With Stabilized Base

(*Continued from page* 1)

as County Trunk J, this route is 12 miles in length, connecting State Trunk Highway 32 from the east with State Trunk Highway 57 on the west, and was recently improved with an oil-stabilization base and a 2½-inch asphaltic mat.

Because of its importance as a connecting link, and also because of its location in a very prosperous agricultural area, the expenditure of the extra cost of stabilization, which we believe will add greatly to the life of the road, was deemed advisable.

The soil in this entire area is a very heavy red clay, good for farming but not so good for road-bed purposes. In 1930, this county trunk was improved according to the construction standards of that time. It was graveled and then surfaced with ¾-inch limestone gravel. After having been maintained for several years as a gravel-surfaced road, it was again resurfaced in 1934, taking approximately 1,200 cubic yards of gravel to the mile.

Recent Improvements

By 1938, the road was ready for the preparatory work necessary for the black-top construction planned for the following year. This preparatory work consisted of ditching, draining, and resurfacing with approximately 800 cubic yards of gravel a mile. During the remainder of the 1938 season, the road was maintained as a gravel road, but special attention was paid by the patrol men not to crown the surface but to keep it as level as possible. This was to encourage traffic to use the full 25-foot width of the highway, thereby compacting the entire surface as uniformly as possible.

During the cleaning of the drainage ditches, the clay from the ditches was pulled up on to the traveled portion of the highway. As it was impossible for the men to clean up all of this clay, approximately 2 cubic yards of clay remained on every 100 linear feet of roadway. This clay, of course, was mixed in with the gravel used for resurfacing.

In July, 1939, there was approximately 400 cubic yards of gravel and clay on each mile of roadway and this material was used for the base stabilization work. In some cases, it was necessary to scarify to a depth of about one inch so that there would be about 400 cubic yards of loose material to the mile uniformly throughout the project. About 8,500 gallons of a slow-curing asphaltic oil was used for stabilization, mixing it with the loose gravel by means of motor patrol graders in the manner employed in regular black-top construction. This surface was compacted to an average depth of 1 inch by a 10-ton Roll-A-Plane roller.

When the stabilization work was completed, we immediately began hauling over the surface the materials for the black-top wearing surface, thus further consolidating the large section of the highway over which this hauling was done.

Black Top

The black-top construction from then on was very similar to that carried on in Sheboygan County during the past few years. About 1,000 cubic yards of crushed gravel, all passing a ¾-inch screen, and approximately 14,000 gallons of special heavy SC asphaltic oil were used per mile, motor patrol graders doing the mixing. After the aggregate and oil were satisfactorily mixed, the surface was compacted by the 10-ton roller to an average thickness of 2 inches.

Costs

The approximate cost of the base stabilization, including labor and the bituminous material, was $518.00 a mile.

The cost of the black-top construction was about $2,500 a mile, divided as follows:

1,000 cubic yards of gravel @ $1.00 per cu. yd. (delivered)	$1,000.00
Labor and machinery rental	700.00
Bituminous material	650.00
Distribution and heating, @ 1 cent per gal.	140.00

Judging from the present condition of the surface of the entire 12-mile stretch, every dollar invested will pay dividends.

Future of the Route

If time and weather conditions permitted, we had intended to seal the entire stretch of highway last autumn, using limestone chips prepared by our own crusher, which will give the road a light gray color, adding to the comfort of night driving. However, due to lack of time it was impossible to do this work last autumn, so it is anticipated it will be done as early as possible this spring.

Because of the high grade of both the gravel and bituminous material, this road has stood up well through two winters, with no base failures apparent in the entire stretch.

The new Keystone Model 19-A shovel.

New 1¼-Yard Shovel Is Heavy-Duty Unit

The Model 19-A Keystone shovel recently announced by the Keystone Driller Co., Beaver Falls, Penna., is a heavy-duty machine with a 1 or 1¼-yard dipper and 50-foot boom handling a 1 or 1¼-yard clamshell or dragline, with a capacity of 40,000 pounds at a 12-foot radius or 7,000 pounds at a 40-foot radius. It is powered by a Buda Model JL-877 4-cylinder heavy-duty industrial-type engine of 120 hp at 1,000 rpm.

The dipper boom is the box type, tapered with diaphragm bracing, and the dipper handles are double of internal-reinforced steel, 16 feet in length. The machine has a positive chain crowd, the crowd speed out being 125 fpm and the retraction speed, 180 fpm. This high-lift boom with the dipper open clears a height of 22 feet 8 inches at 60 degrees and has a dumping radius of 26 feet.

The Model 19-A is equipped with booster-set standard main drums, but has planetary jar-proof Keystone swing drums which are one of the features of the unit. Clutches and brake wheels are unusually large and run cool under a heavy load, it is reported. Its construction is sturdy, with a substantial integral steel truck frame resting on four through axles, ample crawlers, machined cast steel side frames, and oversize clutches.

Material for Shasta Comes from 40 States

Almost 6,000,000 tons of cement, steel, machinery, sand, gravel, and other materials, costing $7,686,530, have gone into Shasta and Friant Dam, the Contra Costa Canal and other sections of the Central Valley Project in California, and the expenditures for these supplies have been spread over 40 states, it has been announced by the Bureau of Reclamation.

California has received about 50 per cent of the business, but seven of the ten states whose shares exceed $100,000 are east of the Mississippi River. Purchases from mid-western steel mills put Indiana in second place and Illinois in third place, each with about $760,000.

The significance of the tabulation, according to R. S. Calland, Acting Supervising Engineer of the Central Valley Project, is that virtually the entire country receives direct business benefit from the construction of such a project.

The figures include only expenditures by the Bureau of Reclamation for material which becomes a part of the project and do not include the large quantities of materials on order for future use, or expenditures by the various contractors for plant equipment.

Total expenditures on the $228,010,000 Federal reclamation project at the end of 1940, and including labor, amounted to $54,000,000, most of which was in progress payments on the $82,000,000 worth of contracts in force or completed. Project expenditures are now running about $2,000,000 a month.

Dump Bodies, Hoists Have New Features

A newly developed feature of the line of Anthony low-mounted hydraulic Super hoist models is the special rubber inserts to prevent both "over-run" and "kick-back," the inherent tendency of a dump body to rear over backwards. These special inserts provide a new use for rubber in the manufacture of hydraulic-hoist dump bodies.

Light in weight and positive in operation, it is stated that these inserts replace the heavy chains and springs formerly used to control over-run and kick-back. This new feature, as well as other Anthony features such as low loading height, Push-Pull dash control which works like a choke button, telescopic subframe, and double arm power-speed hoist, is to be found in the complete Anthony line for 1941.

Complete literature covering this line may be secured by interested contractors and state and county highway engineers direct from Anthony Co., Inc., Streator, Ill., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Asphalt Institute Elects Officers for Coming Year

At its recent annual meeting The Asphalt Institute elected Herbert Spencer of the Standard Oil Co. of New Jersey as its first full-time President, for the fiscal year beginning April 1, 1941.

The Vice Presidents elected are J. A. Blood, Standard Oil Co. of California; J. F. Lucey, Talco Asphalt & Refining Co.; and H. B. Pullar of Berry Asphalt Co. A. M. Maxwell of Standard Oil Co. of Ohio was elected Chairman of the Executive Committee, with Messrs. Blood, Lucey, Spencer and Waxman as members; David Waxman of Shell Oil Co., Inc., was elected Treasurer, and George R. Christie, Socony-Vacuum Oil Co., Inc., Secretary.

W. R. Macatee, who had been serving as Assistant and also Acting Managing Director, was made Managing Director to succeed J. R. Pennybacker, who died recently.

New Bulletin Describes Road-Widening Machine

The Buckeye Traction Ditcher Co., Findlay, Ohio, has recently issued a 4-page bulletin describing the three models of the Buckeye highway-widening machine. This machine is similar to a wheel-type trencher, but is truck-mounted and is used for digging subgrade-widening trench.

The bulletin describes the Model 16-R-2 machine which will cut trenches from 12 to 33 inches in width and up to 12 inches in depth, the Model 16-R-4, which will cut trench from 12 to 48 inches wide and up to 12 inches deep and Model 16RD-4 with a rear dump conveyor for discharging material into trucks. Complete specifications are given and illustrations show the units in operation.

Copies of this bulletin may be obtained by interested contractors and engineers direct from the manufacturer by referring to this item.

Two Miles of Ledge On Ohio Relocation

A. J. Baltes of Norwalk, O. Working on 3.5-Mile Heavy Grading and Paving Job Along the Ohio River

(*Photos on page 52*)

✦ THE contract for grading and paving the 3.499-mile relocation of Ohio Route 7 along the Ohio River in the southeastern section of the state was awarded to A. J. Baltes of Norwalk, Ohio, on his low bid of $351,855.40. The preliminary soil surveys for the improvement of the original highway showed that the road had no foundation and this was well indicated by settling of as much as 1 foot overnight when light fills were laid over the unstable spongy red clay. This led to the relocation of the highway at a higher elevation on sandstone ledge which forms the base of the new road for nearly 2 miles, the balance being fill and a short section of light grading.

The contract was awarded November 17, 1939, and work started April 15, 1940, with the contract completion date July 31, 1941. The major operation during the first half of the work was to open up the 10,000-foot side-hill rock cut of 350,000 cubic yards and haul rock to the big fills at either end. On the south end some wasting of rock was necessary. The 12 to 20-foot overburden consisted of earth and a seam of about 2 to 6 feet of clay on poor shale which rests on the sandstone. The maximum side-hill cut was about 40 feet.

Drilling and Shooting

All rock faces were specified to be ¼ to 1 and in several places where the cuts were very deep were benched, but the shale weathered rapidly and broke down. Furthermore, the poor character of this rock made shooting very difficult to avoid breaking back and loosening too much rock or shooting too light and then having to do too much trimming. There were three very large overhanging boulders on the job, running around 150 cubic yards each, with numerous other boulders from 10 cubic yards up along the right-of-way. A LeTourneau Angledozer was used primarily for cutting the benches and for cleaning off rock ledges preparatory to drilling operations, ahead of the shovel. The three large boulders were drilled and loaded lightly so that they would break into small pieces and not be scattered too far as the present roadway is immediately below the new location and carries heavy traffic. All boulders of 1 cubic yard or more and all ledge rock which broke in these sizes were blockholed and shot with 1/3-stick of dynamite fired with a fuse.

The compressed-air drilling outfit was comprised of a Cleveland wagon drill and four Cleveland jackhammers, using 24-foot steel on wagon drills and 6-foot steel on the jackhammers. Jackhammers with 18-foot steel were used where inaccessibility prohibited the use of the wagon drill. Air was supplied by an Ingersoll-Rand 315-cubic foot gasoline-engine-driven compressor on the hill and the air for blockholing was supplied by a Davey 210-cubic foot compressor mounted on a Caterpillar Sixty tractor. The drill crew consisted of a drill man and helper on the wagon drill and a drill man with each of the jackhammers and a helper for each two. A compressor man took care of the large unit on the hill. Timken detachable bits were used

(*Concluded on page 50*)

C. & E. M. Photo

One of two 10-yard Koehring Wheelers which hauled rock on A. J. Baltes' job.

The first of the 2½-ton Reo trucks for the U. S. Army Quartermaster Corps, to be used for construction around army cantonments. Of the 300 trucks in this order, 260 will be equipped with dump bodies and 40 with cargo bodies.

New Electric-Drive Concrete Vibrators

The increasing practice of vibrating concrete during pouring has been accompanied by continual improvement in equipment and the addition of new models by makers of concrete vibrators. These have been developed to improve the performance of early apparatus or to meet new requirements. The White Mfg. Co., Elkhart, Ind., producer of flexible-shaft-driven vibrators operated by gasoline engines or electric motors, has announced a new model in its electric-motored equipment.

Heretofore White vibrating outfits, for use on power circuits or with portable generators, have been supplied with light-weight universal motors for 110 or 220-volt current, or with standard-speed motors having a geared-head set-up to give the high speeds desired in vibrating concrete. The universal motors, weighing only 30 pounds, are continued, but a new model for 220/440-volt 3-phase current has a V-belt countershaft and supersedes the geared motors.

The new model is either ME-16 with a 1-hp motor, or ME-17 with 1½-hp motor. To increase from 3,450 rpm to 6,800 or as high as 8,000 rpm, the same type of countershaft with V-belt and pulleys is used as is supplied with White engine-driven outfits. This is believed to be the first such arrangement offered by vibrator makers. Among the advantages claimed are the use of standard-make induction motors which can be serviced anywhere; driving speeds can be changed readily simply by using different-size pulleys; and this drive is less severe on the driven parts of the apparatus than with geared heads.

In the White flexible drive, all drive sections are interchangeable, and all vibrators are interchangeable and can be opened for inspection. The shaft sections are supplied in 7 and 12-foot lengths and can be coupled together in any multiple.

For further details write to the manufacturer and mention CONTRACTORS AND ENGINEERS MONTHLY.

Handling Bulk Materials By Drag Scraper Machines

The use of Sauerman drag scrapers for handling and storing materials such as aggregate or earth in sand and gravel pits, borrow areas, or in storage yards, is described and illustrated in a new informative bulletin recently issued by Sauerman Bros., Inc., 464 So. Clinton St., Chicago, Ill.

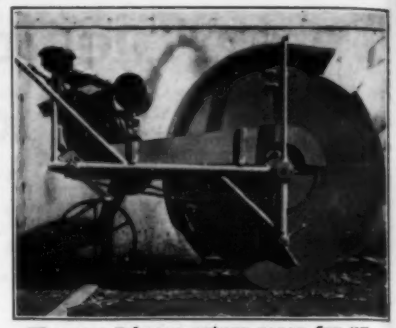
According to the manufacturer, it is the purpose of this bulletin to give readers, in simple accurate terms, a general idea of the design, construction and methods of applying Sauerman scraper equipment to storing and reclaiming bulk material problems in a number of typical situations.

Copies of this Bulletin No. 153, which is generously illustrated with working drawings and action photos, may be obtained by interested contractors, state, county and township engineers direct from the manufacturer by mentioning this magazine. Or if any reader has a definite storage problem of his own, he can obtain a complete recommendation of a machine best suited to his requirements by sending a description of his material-handling problem to the Sauerman Engineering Department.

New Rotary Scoop For Bulk Cement

One of the factors in the profitable conduct of a job on which bulk cement is used is the speed with which the cement can be unloaded from the box cars. A new piece of unloading equipment which is designed to speed up this operation as well as to provide more healthful working conditions for the men has recently been announced by The C. S. Johnson Co., Champaign, Ill.

This new Johnson rotary scoop consists of a series of tooth-edged buckets which rotate in an enclosed outer shell and is powered by a 2-hp gasoline engine conveniently placed just below the handle with which the scoop is pushed about. The scoop is mounted on two narrow-rimmed wheels, while a third trolley wheel is mounted in back, below the handle. In operation, the scoop is pushed into the cement and the series of buckets pick up the cement until the scoop is full. It is then wheeled to the car door where it is discharged into trucks or the receiving hopper of cement batching and transfer plants, or into cement screws leading to the boot of any cement elevator.



The new Johnson rotary scoop for unloading bulk cement.

Further information on this new cement scoop may be secured by interested contractors and engineers direct from the manufacturer by referring to this item and asking for Form 9-20-40.

Want information? Write the Editor.

Trimble County, Ky., Road Organization

Income from Taxes in a Sparsely Populated County Inadequate for Road Work; Getting Most for Money

✦ TRIMBLE County, on the northern border of Kentucky along the Ohio River, has its county seat at Bedford, where 600 of its total population of 5,500 live. The county has an area of 400 square miles and endeavors to maintain its approximately 125 miles of county roads with a meager budget of slightly over $10,000 a year.

Highway affairs are administered by the four Justices of the Fiscal Court, all of whom are elected at the same time every four years. Each of these Justices is responsible for all road work in his district and the mileage of roads in the districts is nearly equal. The Court buys road equipment for the county as a whole and rotates its use on the roads in the various districts as required.

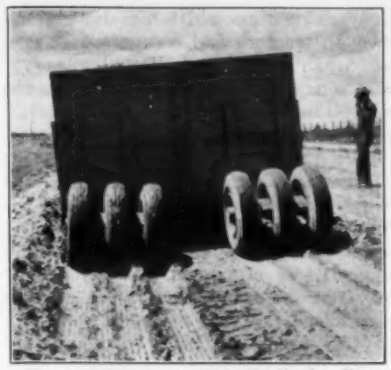
The present road equipment in Trimble County consists of a new Caterpillar Forty tractor, an 8-foot Adams leaning-wheel grader, and seven motor trucks, including Chevrolet and International trucks and one White truck. In addition there is a rock crusher which is not used at the present time because reliance is placed chiefly on WPA projects to improve the roads with crushed stone in collaboration with the Rural Highway Division of the Kentucky Department of Highways.

The highway situation in Trimble County has improved greatly in the past four years, and in the period from 1938 through 1940, a total of 26.7 miles of roads have been regraded, the ditches properly prepared and culverts installed, and the 16-foot road surfaced with crushed stone, although there is plenty of gravel in the county. Practically all of this mileage will eventually be surfaced with road-mix and, where the right-of-way is 60 feet, the road will be taken over by the State Highway Department for future maintenance. The oiling, or road-mixed surface, is not a requisite for the transfer of the responsibility for maintenance.

Financing

The income, totaling approximately $10,000 a year, for road work in Trimble County is divided about equally between income from a 20-cent tax per $100.00 of assessed valuation and the income from the state truck license fees, the money of which is divided equally among the 120 counties in the state. The assessed valuation of Trimble County in 1940 was $2,547,000.

The information on which this article is based was furnished by Wallace Wright, County Clerk of Trimble County, Bedford, Ky., in a personal interview by the Editor. The present Justices of the Fiscal Court of Trimble County, whose term of office expires the first Monday in January, 1942, are W. B. Moore, Milton, Ky., E. A. Mullikin, Bedford, O. C. Harmon, Bedford, and Arthur Morgan, Pendleton.



The new Ingram pneumatic-tired roller with ballast box.

A Pneumatic Roller For Fill and Base

A pneumatic roller, built with oscillating front and rear axles and a low center of gravity, is being made by J. E. Ingram Equipment Co., 1146 West Laurel St., San Antonio, Texas, for use on fill, slopes or road base to provide the required uniform compaction.

The roller is equipped with ten smooth-tread 7.50 x 15 tires with a total rolling width of 60 inches. The overall width of the roller is 7 feet 3 inches and it has a 10-foot wheelbase with a 10-inch clearance under the all-steel electric-welded frame. This roller looks like a shortened equipment trailer and weighs 3,800 pounds without the box or ballast with which it can be equipped to give a ground pressure up to 350 pounds per inch of tire width or 500 pounds if the roller is equipped with 10-ply tires.

The Ingram roller is equipped with Timken bearings throughout and because of its low center of gravity will not upset on sharp turns, slopes, or in ditches. It is reported that the number of tire blowouts is remarkably small. Its outstanding feature is the oscillating axles which permit the tires to dip down and compact the soft and low spots.

Further information will be found in literature which may be secured direct from the manufacturer. Please mention this item.

Andrew Weesner, Field Superintendent for Clyde Wood, with the trailer-mounted air compressor which was easily towed about the job to inflate tires.

Reservoirs Improved By Dikes and Canal

(*Continued from page 7*)

it is full, water will be discharged from the canal into the spillway at the rate of 5,800 cubic feet a second. The latter is a short concrete conduit from which water had washed out a deep channel below. This ravine was excavated and recompacted to channel grade and the spillway extended to a natural water course emptying into the Los Angeles River just above Sepulveda Dam on the opposite side of San Fernando valley. (C. & E. M., Oct. 1940, pg. 1) A unique feature of this canal is that it will be used as a roadway most of the time, rain being so rare (it is reported) that only occasionally will water interfere with dry-canal traffic.

Avoiding the all-too-common mistake of trying to do all types of work with the same equipment, Clyde Wood endeavors to provide equipment suited to each particular job. All of the San Fernando excavation might have been done with scrapers or by power shovels loading to trucks. However, since there were long and short hauls, both types of equipment were employed.

For the long hauls, Wood purchased four bottom-dump Euclids powered by 150-hp Cummins diesel engines after observing the performance of this type of equipment at Sepulveda Dam where six such units gave such good service that the number was increased to twelve. For the shorter hauls, tractors and scrapers of different sizes and types were provided, carrying out Wood's policy of using the right piece of equipment for each particular operation. Two 30-yard RU Carryalls, pulled by 100-hp Caterpillar diesels, were used for the heaviest work, while two 13-yard J-13 LeTourneau scrapers and a 17-yard Gar Wood scraper, with three Caterpillar tractors, were also used. Six Allis-Chalmers diesel tractors powered by 100-hp 6-cylinder motors and equipped with the new A-C lubricating system, which makes possible 200 hours of operation on one oiling, were also on the job.

Two power shovels, a 2½-yard diesel-powered Koehring 801 and a 1½-yard Thew-Lorain, loaded the excavated material to the Euclids, while a half dozen Caterpillars with bulldozers, two sheepsfoot rollers made by the Southwest Welding Co., and a heavy-duty rooter were also used.

Most of the excavated material was a dry, light, sandy soil. In order to keep down the dust, which is bad for both men and machines, to make the material easier to handle and to eliminate as much embankment sprinkling as possible, pre-wetting was practiced as far as practicable, with rotary sprinklers throwing water 100 feet. Roads and fills were sprinkled by an Autocar equipped with a Cummins diesel engine, a 2,500-gallon tank and a pressure pump.

Working three shifts on shovels and two on tractors and scrapers 6 days a week, an average of 10,000 yards of dirt a day was moved, with a maximum of 100 men on the job.

Canal Paving

The San Fernando canal was lined with a paver which Clyde Wood invented and which he used successfully on his $1,500,000 contract on the Colorado River Aqueduct. One of these pavers is being used to line the Contra Costa Canal, a part of the Central Valley irrigation project. (See C.&E.M., Nov., 1939, pg. 1).

The Wood canal paver consists of a U-shaped steel framework conforming to conduit contour, mounted on small wheels running over a track on either side of the ditch. The tracks are made of small street-car rails supported by short ties. It is carried forward in sections and relaid by hand, the rails not being fastened together. The machine is raised and lowered by small hydraulic hand jacks at each of its four corners, is pulled forward by a tractor running in the bed of the canal and attached to the paver by an A-shaped pipe tongue.

A MultiFoote concrete paver delivered the concrete to a 1-yard bucket running on a track across the front end of the Wood paver and pulled back and forth by a winch powered by a small gas engine. Concrete dropped from the bottom of the bucket through a chute into a metal form extending across the canal and having baffle plates along the slopes to hold the material in position, where it was leveled by workers standing on the floor of the paver. As the machine was pulled forward, its smooth metal base operated as a huge trowel, pressing the concrete to the required grade. Finishers worked on a wooden framework following behind the paver, running on the same tracks and having stair steps along the side slopes for the workmen.

Operated by a dozen men, this paving equipment laid 300 cubic yards of concrete in 6-inch slabs a day, moving ahead so fast that hand trimming and compaction had difficulty keeping ahead of them.

On large jobs Wood uses a canal trimmer or subgrader, also of his own design, and similar in construction to the paver. But on this job the canal was trimmed by blades attached to the front of the paver.

While canal paving is usually left as smooth as possible to facilitate the flow of water, this job was made quite rough in order to reduce the velocity of the bypassed water.

Embankment Paving

The asphalt paving at San Fernando was sublet to Goode & Schroeder of Los Angeles. The paving was laid in 9-foot vertical sections separated by 2 x 4's and afterwards compacted by a 24-inch iron roller heated by a fire inside a metal box swung from the axle. The roller was pulled up and let down the slope by a ½-inch cable attached to a winch on a Fordson tractor. The latter was used for compacting on the level, having drive wheels with 12-inch metal tires and concrete filled in between the wheel-spokes flush with the tires to give the required compacting weight.

Personnel

The work at San Fernando was done for the Los Angeles City Water Department, for which H. A. Van Norman is Chief Engineer. Hugh Mulholland was Resident Engineer; R. R. Proctor, Engineer in charge of field construction; and Max K. Socha, Engineer in charge of contract coordination.

For Clyde Wood, contractor for this project, Andrew Weesner was Superintendent. Asphalt paving was subbed to Goode & Schroeder, and the J. F. Shea Co. of Los Angeles constructed the enclosed conduit.

LeTourneau officials inspect the 15,000th power control unit made by that company.

Power Control Units Reach 15,000th Mark

On February 14, the 15,000th cable-controlled power unit for Le Tourneau equipment was completed at the factory of R. G. LeTourneau, Inc., at Peoria, Ill., and shipped to a contractor in California. According to the manufacturer, the LeTourneau company has made and sold more cable-controlled power units than any other company. These units transmit tractor power through cables for instantaneous operation of earth-moving machines and cranes.

As one of these units is used with each Tournapull, bulldozer, Rooter, Tournatrailer, Carryall and tractor crane made by LeTourneau, this record indicates the number of such machines in use throughout the world.

The record-making power-control unit being inspected by J. F. Johnnsen, Export Manager, and E. R. Galvin, General Sales Manager, of R. G. LeTourneau, Inc., is a two-drum Model T with double-decker sheaves.

Grand Coulee Power Production Has Begun

On March 22 the power plant at Grand Coulee Dam in Washington went to work. On that date two 10,000-kw station service generators in the Grand Coulee plant were cut into the Bonneville transmission line and began their work of contributing kilowatt hours to the normal and defense needs of the Pacific Northwest. Three giant generators are now being installed, one to be completed in August, one in November, and the third in 1942. These will each have a capacity of 108,000 kilowatts, the largest in the world.

Just 7 years, 7 months and 26 days elapsed since the day on which President Roosevelt approved the first allotment of $15,000,000 of Public Works funds for the Bureau of Reclamation to start work on this great irrigation and power project. Grand Coulee Dam, 550 feet high, 4,300 feet long, and containing 11,250,000 cubic yards of concrete, is the largest structure ever erected by man.

Tree Trimming Equipment And Asphalt Pruning Paint

In the care and preservation of existing trees and shrubs along the roadsides and of new roadside plantings, state and county highway maintenance crews and roadside-development contractors have need for a variety of tree trimming equipment, as well as supplies for the care of trees and shrubs.

Among the tree surgery supplies made by the Bartlett Mfg. Co., 3003 East Grand Blvd., Detroit, Mich., is the Bartlett antiseptic pruning compound, made of a pure Egyptian asphalt base, for the protection of wounds after pruning and to prevent the growth of wood-destroying fungi.

Other equipment made by this company includes combination pruners and saws, lever tree trimmers, various types of saws and pruning shears, and standards and warning signs for use when highway crews are at work along the roadside.

Catalog No. 26, describing and illustrating the Bartlett line of tree trimming supplies, may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Power to Tax Non-Resident Contractors

A decision rendered by the United States Circuit Court of Appeals, Fourth Circuit, September 6, 1940, deserves close study by any one interested in questions concerning the right of a state to impose tax burdens upon non-resident contractors doing transient business. The Court also passed upon the liability of a taxpayer for penalties and interest on a partly void tax. The decision was rendered in the case of Dravo Contracting Co. v. James, 114 Fed. 2d, 242, and has all the force that belongs to an opinion of a tribunal that ranks second only to the United States Supreme Court. The conclusions of the court are, of course, subject to reversal by the Supreme Court, but we are not informed whether or not any attempt will be made to secure a review of the case. The chances that the decision will be reviewed by the Supreme Court are diminished by the circumstance that at an earlier stage of the case that tribunal did decide certain points of law which are now followed by the Circuit Court of Appeals.

The outstanding facts of the case are as follows: The contracting company is a Pennsylvania corporation having its principal place of business and plant in that commonwealth. It contracted with the United States to construct certain dams and locks in rivers in West Virginia, and received payment on performance. The West Virginia Tax Commission assessed more than $135,000 in taxes and penalties against the corporation on the gross amounts received from the Government.

Guided by conclusions reached by the highest court of the land on the earlier appeal in the case (James v. Dravo Contracting Co., 302 U. S. Rep. 134) the Circuit Court of Appeals has now reached a decision of which the following is a summary.

Apportionment of Income

Since the West Virginia gross income tax law did not provide for an apportionment of a non-resident contractor's income upon the basis of the cost of activities inside and outside of the state, the courts were powerless to make such an apportionment. That is a legislative, not a judicial, function. As decided by the United States Supreme Court in several cases, "where the tax imposed is not in its nature divisible and some part thereof is beyond the taxing power of the state and no provision is made for apportionment, the whole tax is void."

But the language of the statutes involved, as interpreted by the Supreme Court, require a conclusion that the West Virginia Legislature intended that the privilege tax should be imposed upon that part of the contractor's income falling within the state's taxing power. The statute imposed a tax upon "engaging or continuing *within the state* in the business of contracting."

"The business here involved was contracting for the erection of locks and dams within the state. With the exception of the *deliveries and the fabrication at the Pittsburgh plant, for which partial payments were made with passage of title to the government*, all of the activities upon which payments were made occurred within the state, and the income derived therefrom was subject to the state's power to tax. Certainly property brought within the state was subject to that power; and *no distinction can be drawn between the state's power to tax the property and its power to tax income received upon delivery of the property within the state by the contractor or its incorporation by him in the dams and locks.* * * * It is well settled that, where income subject to the state's taxing power is separable from that which is not, a tax will be upheld as to the portion which is so subject."

What Can Not Be Taxed

But, as stated by the Supreme Court, a state has no power to impose a tax "*upon receipts in other states for work done in other states.*" On the other hand, the state may impose a tax despite "the fact that the contractor may have prepared materials in other states for use under the contract, * * * *if they were used in the performance of the contract in West Virginia and payments were dependent upon such use.*"

The Circuit Court of Appeals draws an analogy between the taxation of property brought into a state by a contractor for installation and the taxation of goods brought into a state, under a contract of sale, for consumption there. After referring to a decision of the Supreme Court, upholding a state's use tax on goods brought into the state for consumption, the Court of Appeals says: "On the same principle, the state unquestionably may tax the income of a contractor arising upon construction within the state or delivery within the state at the site of construction; and the fact that the materials may have been fabricated in other states, either by the contractor or others, cannot affect the state's power."

The Court of Appeals ordered a decree "enjoining the collection of only so much of the taxes as were assessed upon the portion of the income of taxpayer derived from payments made upon deliveries or fabrication at its Pittsburgh plant."

Penalties and Interest Annulled

Although the contracting company was thus found to be liable for a tax on a large part of the receipts from its work under these contracts, it is interesting to note that the company was relieved from liability for accrued interest and penalties on account of nonpayment of the tax. The reasons for throwing off penalties and interest are thus stated by the Court of Appeals in terms applying to any sort of a lump-sum tax that is found to be partly invalid:

"The assessment was made upon a basis held by the Supreme Court to be erroneous in that it included in the gross income of the taxpayer partial payments made on account of the materials delivered or fabricated at the Pittsburgh plant. No assessment of the correct amount of the tax has even yet been made. Moreover, the tax as assessed was not severable so that taxpayer was given an opportunity of paying the amount properly due; and no opportunity was given to pay the entire amount and sue for the recovery of the portion illegally assessed. Taxpayer was justified in contesting liability for the taxes as assessed; and until the income to serve as the basis for taxation shall be ascertained and the taxes thereon determined, it would be inequitable to allow penalties for non-payment to be collected. * * * *

"The question as to the allowance of interest is a more difficult one. It is true that the statutes of West Virginia make no provision for the collection of interest upon delinquent taxes; and it is well settled that in suits for the recovery of such taxes interest is not recoverable unless authorized by statute. * * * Courts of equity, however, in restraining the collection of the illegal portion of a tax may, in the exercise of their discretion, require the payment of interest on the legal portion, even where there is no statutory provision for payment of interest. * * * But in this case it must be remembered that the legality of the entire tax was a matter of grave doubt until the decision of the Supreme Court, wherein its legality was upheld by a divided court. Under that decision the tax as assessed was held invalid and it was pointed out that an apportionment of income would be necessary to determine the correct amount of the tax. * * * Until the amount of the tax is fixed, so that the taxpayer may know with certainty what amount he is required to pay, we think it would be inequitable to charge him with interest. Particularly is this true in view of the fact that taxpayer has been furnished no opportunity under the law of paying the tax under protest and suing for the recovery of the illegal portion."

1941 Highway Work In State of Texas

The Texas State Highway Commission announced recently its initial 1941 asphalt program which extends over the entire state and includes 200 projects in 128 counties. The total estimated cost of the asphalt program is $2,434,100, made up as follows:

Seal coats	870 miles
Reconditioning base and asphalt surface	88 miles
Asphalt leveling course and seal coat	386 miles
Heavy asphalt surface	237 miles
Widening existing surface or shoulder surfacing	103 miles
New asphalt surfacing	84 miles

Of these, 60 projects totaling 30 per cent of the total miles of construction are located on the designated strategic highway network.

Bids have been received for construction work amounting to $2,975,000, as follows:

Grading and drainage structures	24 miles
Grading, structures, base and surfacing	69 miles
Base and surfacing	59 miles
Concrete pavement	13 miles
Asphalt leveling courses and seal coats	223 miles
Grade separations	2 miles

DeWitt C. Greer, State Highway Engineer, called attention to the fact that the 6,375 miles of Texas state highways which have been designated by military authorities as part of the national strategic network represent 28 per cent of the maintained Texas highway system. About 125 miles, or 32 per cent, of the improvements listed above are on the strategic network. Because the type of construction required for military movements is higher than for ordinary traffic, the improvement of these 125 miles will cost $1,774,000, or 60 per cent of the total letting.

Roadside Project Corrects Erosion

(*Continued from page 33*)

tion had proved the value of such ditches in permanently correcting erosion both in the ditches and on the backslopes.

Sodding

The contract called for slab sodding all backslopes and ditches, except where the native-stone lining was used. Bermuda sod was used throughout the project and was cut 2½ inches deep. Sod for stripping was cut 3 inches wide and for slab, 1 foot wide. Four hundred pounds of 4-8-4 fertilizer was broadcast over all areas to be sodded and was incorporated with the soil. Furrows were then opened for the strip sod on the shoulders and front slopes. After placing and partly covering the sod, a cultipacker roller was used several times over the area, resulting in an excellent finished job. This was the first time a cultipacker had been used on roadside development work in Louisiana, but it produces a very satisfactory result, breaking up clods, smoothing the ground surface and leaving it in a mulch condition. The backslopes were scarified and after the slab sod was placed it was tamped.

Trees Saved

One of the important features of this contract was the preservation of the large native trees. At the beginning of the work, all large trees to be saved were marked by the landscape engineer and throughout the work extreme care was used by the workmen in excavation and other operations close to the trees so as not to damage their roots. In addition, many existing shrubs were saved. Later, all trees needing it were pruned to remove dead and unnecessary limbs. In order to add to the attractiveness of the route, native flowering trees and shrubs were planted at advantageous points.

Roadside Park

The roadside park included in the contract is approximately one acre in area, with a 300-foot frontage. It has two entrances of gravel which widen out inside the park for parking purposes. There are two barbecue ovens, six tables and seats, and a well for drinking water. The site was selected because of its attractiveness, its sloping well-drained surface, its location, and the many native trees consisting of pines and oaks. The trees were selectively thinned and those to remain were properly pruned. A portion of the area was covered with Carolina jasmine vines and these were carefully preserved.

Personnel

This contract, FAP 114-B(2), for 3.826 miles of roadside development on U. S. 80 in Ouachita Parish, La., was awarded to the Glassell General Construction Co., of Shreveport, La., for $45,019.99. Ashton Glassell is President of this contracting firm, and Melvin Hall was Superintendent on this job.

In nominating Glassell for one of the 1940 Roadside Development Awards, the Louisiana highway engineers stressed the excellent execution of this job, the unusual care exercised by the contractor in carrying out the specifications and particularly in the preservation of trees and shrubs, and the full cooperation extended to the Highway Department engineers.

For the Department of Highways, of which Torbert Slack is Roadside Development Engineer, R. H. Vaughan was Resident Engineer on this project.

Protective Guards For Extension Lights

In the use of a portable "trouble light" in state and county garages and shops and in contractors' field repair shops or for emergencies on the job, there are many occasions where water, moisture, dust and electrical hazards present a serious problem in the effective and safe use of the light.

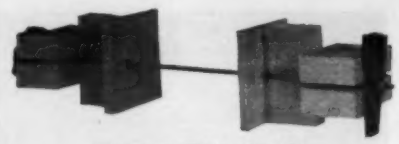
New metal and fibre lamp guards furnished with a Water-Seeled socket, made by the Safeguard Electric Co., Inc., 1 DeKalb Ave., Brooklyn, N. Y., are designed to eliminate such problems. The Safeguard No-Tool lamp guards have a rubber handle to which there is attached, by means of a rubber locking ring, a Safety-Fibre or Rugged-Metal cage. The Water-Seeled socket is placed within the handle, and a rubber shoulder projects from the top edge of the rubber handle. This holds the socket firmly and securely so that it can not slide or come out of the handle at any time. Once assembled, it is claimed that the entire guard with the lamp burning may be immersed in water, without damage to the lamp or danger to the operator.

Further information on the Safeguard portable-lamp guards and Water-Seeled socket may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

New Type of Tie For Form Clamps

A new quick-operating spreader-type wire tie for form clamps which is removable for reuse has been brought out recently by the Williams Form Engineering Corp., 46 East Hall St., Grand Rapids, Mich.

The spreaders of this form clamp assembly fit against the inside of the sheeting, and are locked in place by projecting jaws that fit into opposite grooves on the tie. After the concrete is set, the tie is released by giving it a quarter turn with the Williams puller while the spreaders are held firmly by the concrete. This action forces the jaws of the spacer out of the grooves and onto the smooth part of the rod which permits pulling the rod without interference with the spacer.



The new Blitz wire tie.

The tie is adaptable for use with different types of tie-holders. Standard wedges can be used abutting against an adjustable stop; set screw "buttons" can be used with plain rod ends; and Williams screw-type Fly-Nuts screw directly onto the tie ends. It is recommended that at least one end be threaded for use with the Williams Speedy puller. This tie is particularly applicable where the specifications require removal of the tie and eliminates the possibility of any metal remaining near the surface. The hole is filled with grout from a pressure gun.

Further information on this Blitz wire tie for form work is contained in pamphlet No. 47, copies of which may be secured from the manufacturer.

C. & E. M. Photo
The new Ingersoll-Rand K-105 Mobil-Air portable compressor was exhibited for the first time at the 1941 convention of the Association of Highway Officials of the North Atlantic States in Boston, Mass.

Air Compressor Has Many New Features

The Mobil-Air portable air compressor just announced by the Ingersoll-Rand Co., 11 Broadway, New York City, is reported by the manufacturer to be an entirely new development incorporating many new ideas in compressor design and construction. During the three years it was in the making, every detail underwent development, refinement and gruelling tests.

One of its features is its convertible engine which can be changed from gasoline to oil operation or vice versa by making a simple substitution of fuel accessories in the owner's shop, no changing of engines, engine heads or pistons being necessary. This engine convertibility enables the owner to use the fuel most economical on his present work and to change over to the other on a future job if it seems more economical to do so. The engine, developed especially for the Mobil-Air, is made by the Waukesha Motor Co., and employs the same high-turbulence combustion chamber used in the I-R Type H oil engine. To change from oil to gasoline, it is necessary only to remove the fuel pump and injector nozzles, substitute a carburetor and change the spark plugs. It has full pressure lubrication throughout, and accessories include an oil-bath-type air cleaner, a heavy-duty fuel supply pump, a fuel filter, and a waste-packed lubricating-oil filter with bypass connections.

The new two-stage air-cooled compressor with which the Mobil-Air is equipped has larger channel valves and larger streamlined air passages to reduce the horsepower required. A new patented Drill-More multi-speed regulator adjusts the engine speed to the use of air, eliminating wasteful idling, and reducing the average working speed of the compressor and engine, it is stated.

The Mobil-Air is made in two models, K-105 and K-160, both of which are available in a two-wheel mounting with 32 x 6 10-ply pneumatic tires, four-wheel mounting on pneumatic tires or steel wheels, or for truck mounting. Model K-105 has a capacity of 105 cfm and Model K-160, 160 cfm. Other sizes which may be secured are 60, 85, 210, 315 and 500 cfm.

A new well-illustrated booklet describing and illustrating the features of Models K-105 and K-160 Mobil-Air portable compressors has just been issued. Copies may be secured from the manufacturer. Ask for Form 3074.

New Aids to Peeling Asphalt From Brick

The surface removal method in brick pavement construction, whereby the spaces between the bricks are filled by flooding the newly laid brick courses with hot asphalt and then, after cooling, shearing and peeling away the asphalt surface mat, has been in successful use for some years. This method has been made possible by the use of a separating agent which, when applied to the top of the bricks prior to the filling with asphalt, prevents adhesion of the asphalt thereon. However, too often in the past, caution has not been used in the application and the separating agent has been permitted to flow between the bricks where it prevented the desired adhesion of the filler to the sides of the brick. The devising of a means to confine the separating agent application to the brick top engaged the attention of the National Paving Brick Association Research Bureau for some time.

Knowing that the agents commonly used were mobile liquids which readily flowed between the bricks, the first step was the development of an agent of such viscous nature that such flow would not occur. Experiments developed a mixture consisting of 64 per cent water by weight, 31 per cent calcium chloride and 5 per cent starch as a separator of the desired viscous property. The preparation is secured best by mixing the starch and the water and then adding calcium chloride with stirring. In this way the heat of solution of the calcium chloride aids in a thorough digestion of the starch.

A roller device was then designed to apply the agent. This roller is a solid wood cylinder 6 inches in diameter and 20 inches long, covered with a 1-inch thick sponge-rubber sleeve from the outer surface of which the rind or skin has been removed to expose the pores. Suspended above the roller is a wooden feeding hopper, the bottom edges of which are trimmed with flexible rubber squeegee wipers. The hopper is adjustable vertically so that there is proper contact with the sponge rubber sleeve. A quantity of the separating agent is placed in the hopper and the device is rolled over the brick course. The roller in passing under the hopper receives a controlled coating of the agent which is in turn deposited on the top of the bricks.

The experience thus far gained shows that the roller may be used with agents ranging from mobile liquid to a paste or jelly. This experience also shows that insurance against the flow of the agent down the brick sides may be secured only by the use of a very viscous or non-flowing agent.

Link-Belt Speeder Shovel Distributor Appointed

Link-Belt Speeder Corp., Chicago, Ill., announced recently the appointment of the Edmunds Supply Co., 193 S. St. Clair St., Toledo, Ohio, as distributor for the complete line of Speeder and Speed-o-Matic shovels, draglines, cranes, ranging from a fast mobile ⅜-yard unit to a heavy-duty 3-yard machine.

Illinois Plans Work On Highways in 1941

More Than $4,000,000 for Access-Road Construction: Rest of System Can Not Be Neglected and Is Also Vital to Defense

✦ IT APPEARS that Illinois will have available from estimated 1941 revenues approximately $21,690,000 for new construction, according to Chief Engineer Ernst Lieberman. In addition, $7,040,000 is being carried over from 1940 for projects on current programs for which contracts have not yet been advertised.

It is probably safe to assume that not all of the available funds will be obligated by awards before the end of the year, but that total contracts awarded during the year will run between $20,000,000 and $25,000,000 in value.

Of major concern to everyone interested in state highway work is the effect of the defense program on this year's construction. That is a question which cannot yet be fully answered. However, this much seems certain: that something in excess of $4,000,000 will be used for defense projects. In other words, a sum equal to practically 75 per cent of the total Federal Aid allotted to Illinois this year, $5,658,000, is being assigned to defense roads.

The exact make-up of the defense program has not yet been agreed upon, and it is not possible to publish the full details at this time. However, it will include all classes of construction, from low-type surfaces to high-type pavements.

A large part of the balance of the State's construction program will consist of modernization of highways which are included in the strategic network designated by the military authorities. The State's contribution to national defense will, therefore, be much greater than the $4,000,000 worth of improvements to military access roads.

Federal Funds Needed

Two facts seem to be apparent. First, the State cannot abandon all consideration of its non-defense highways. Second, even if it were to concentrate all of its available construction funds on access roads and strategic highways, it still could not finance the desired improvements in time to fit the emergency. This is the situation, of course, in all of the states, and leads to the obvious conclusion that if adequate and modern highways are vital to national defense, further Federal appropriations to accelerate their construction are in order.

Considering the entire state highway system, there are now 947 miles in need of reconstruction. It is estimated that an additional 1,281 miles of pavement will deteriorate during the next five years to the extent that reconstruction will be needed. This means then that 2,228 miles will require rebuilding within the next five years, an average of 446 miles per year.

New 1941 Trucks

With the widest range of truck equipment it has ever offered, 108 regular models, the line of Mack trucks for 1941 includes units from 1 to 45 tons, gasoline or diesel-powered, conventional or cab-over-engine types, shaft or chain driven.

There are 54 gasoline-powered models, including 11 4-wheel conventional shaft-driven models and 7 4-wheel conventional chain-driven models. There is also a large selection of conventional 6-wheel types, while in the cab-over-engine design, 8 4-wheel models are in production as well as 5 6-wheel 4-wheel shaft-drive models. Also for 1941 are the new series of tractor models and a series of four small light-weight dumpers, designed specifically for service in the dump-truck field.

Besides its gasoline-powered truck models, Mack Trucks, Inc., Long Island City, N. Y., is also offering 54 diesel-powered models with engines ranging in size from 212 to 605 cubic inches. Employing the Lanova principle of controlled combustion, these diesel engines are claimed to feature high power output and great economy. In addition to conventional and cab-over-engine diesel-powered trucks, there are also diesel tractor models and a number of light-weight dump trucks.

In addition to its full line of truck and tractor models, Mack also produces two standard semi-trailers, a feature of which is the Mack co-incidental safety lock by means of which the act of raising and lowering the support wheels automatically engages and disengages the parking brake.

New Waterproofing Compound for Masonry

A new liquid-type waterproofing compound for masonry, concrete walls and foundations, which in another form has had 38 years of practical application, has recently been placed on the market under the name of Hydrozo. This product is a colorless synthetic mineral gum reduced with a volatile to form a liquid compound, thus facilitating its application to surfaces by means of a brush or spray.

The producer, the Hydrozo Products Co., 2725 Kendall Ave., Madison, Wis., states that it will penetrate the pores of masonry or concrete to a depth of from ¼ to ¾ inch where, after the volatile evaporates, it remains as a gum which is unaffected by heat or cold, thus providing permanent waterproof protection.

Hydrozo is being manufactured by J. E. Blackman, son of its originator, and is marketed through the Hydrozo Products Co., from which descriptive literature may be secured upon request.

Concrete Vibrators

Roeth concrete vibrators for the internal vibration of concrete are available in four models: No. 1, with a 4-hp single-cylinder air-cooled Briggs & Stratton gasoline motor and a vibrating speed of 6,000 to 7,500 rpm; Model No. 2, with a 3-hp engine of the same make and a vibrating speed of 5,500 to 6,500 rpm; No. 3, powered by a Briggs & Stratton 1-hp motor providing vibrating speeds up to 4,000 rpm; and No. 4, an air vibrator driven by a Rotor Tool Co. rotor developing 2.3 hp at 6,000 rpm. Three grades of flexible shaft are available, depending on the service required, and the units may be mounted on wheelbarrow chassis for easy portability about the job.

Further information on Roeth concrete vibrators and on the attachments for use with them, such as various types of grinders, is contained in Bulletin No. 4, copies of which may be secured direct from the Roeth Vibrator Co., 1737 Farragut Ave., Chicago, Ill., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Getting Started! That's The Trick

How Familiar Is This Story To You As a Contractor or A Resident Engineer? And It Really Happened!

✦ THE grief that comes when starting a new concrete paving job may be "various and sundry" and it may be due to a lot of things. Here are our impressions, received on a bright, clear hot morning last summer, of just such a job going through the labor pains of getting the first batch of concrete onto the subgrade.

Batch Trucks Waiting

It was 7:45 a.m. when we breezed onto the job and found an interesting batching set up, with a long line of batch trucks ready to load up with the proper weights and be gone up the grade. Instead there was complete stagnation. Why? The weight truck from the State Highway Department that they thought would be there several days ago to check the scales had not shown up.

It was 9:00 and still the batch trucks waited.

Getting Ready Out on the Grade

In the meantime the contractor was stirring up a lot of activity out on the grade where the paver had been placed several days before, ready for this momentous occasion. There were enough men waiting around to staff five concrete paving jobs and no one seemed in a hurry. Finally we saw the Grade Foreman and he seemed almost happy. He did not have very many feet of forms ahead of the paver and any delay was really in his favor. His crew was setting the forms and aligning them at a merry pace with more audience than they had seen since the last city job they paved.

Clear the way there! Here comes the center-joint machine pushed by a dozen men along the forms toward the paver. "Come here, fellows,—we must get this thing around the paver" so up she went with a man at every place where he could get hold and the machine was lifted around the big paver over the rough shoulder without an accident. There it stayed on the forms right back of the finishing machine which it had been chasing for so many miles over the forms, but with nothing to work on. Then up came a truck with odds and ends of needed equipment. First off was the heavy strike-off to be pulled along by spasms by the paver. That was eased off the truck into the arms of fourteen men and placed tenderly on the forms ahead of the finishing machine.

In the gang of men who seemed to be responsive to orders, you could pick out the puddlers by their rubber boots. They were tucking in the dummy-joint cutter between the finishing machine and the center-joint machine. It was set up on some pins on the back of the finishing machine. So far so good!

There wasn't room on the forms behind the joint machine to put the finishers' bridge on the forms so there it sat all forlorn, awaiting some company. Then a finisher came along, jostled the dummy-joint cutter and shook his head. He then took one of the deformed bars for the tie between the slabs from the trail-grader attached to the paver and bent it into a hook so that the dummy-joint cutter wouldn't fall off when the finishing machine started, if ever.

Leaning up on the right-of-way fence was the array of finishers' tools, straight-edges and floats, large and small, ready to be worked efficiently when there was some concrete. It was then 10 o'clock.

There was a cheer from the crowd, for down the grade someone spotted the first batch truck threading its way over the very loose sand which we had negotiated some time before. Large tires and plenty of speed put us through, although we gave a friendly wave to a tractor operator who we thought any moment might be asked to take a pull on the other end of our steel tow line.

Yes, the Batches Started Rolling

But they stopped! Suddenly the first batch truck slowed up and stopped, then the wheels spun in some "sugar sand," and the grade crew started to work to dig it out. By the time they could get organized all the fleet of batch trucks was lined up behind, with each driver wondering if he could have pulled through that patch where Bill flunked.

Boards, shovels, profanity, and burlap were applied in varying proportions until finally the truck seemed ready to pull out but back it slumped into the hole after kicking all the burlap bags around. That exasperated the Superintendent, so he told the batch trucks behind that they had better pull back and go around to a cross road that came in nearer the paver. That county road was paved anyway!

The grade crew worked hard and in a few more minutes got No. 1 batch on its way so that it passed the cross road just ahead of the first truck that had been sent around. Twenty feet more and down he bogged again in another pocket of loose sand, in spite of the fact that the subgrade had been wet down by order of the Superintendent to make it as firm as possible. This time they were ready for the truck. They pulled in a lot of old wire fabric and more old burlap and put it down to give some foundation when the truck could move a bit back under the heaves of the engines and a dozen grade men. Another fifteen minutes and she was free again only to bog down a third time on the exact spot that had been pointed out by the Inspector as a bad place which he had noted when he was driving over the grade with some survey instruments. Another fifteen minutes was lost and then the truck landed at the paver at 11:09 a.m. They had intended starting at 8 a.m.

Off They Go—Good Luck

With every one of the soft spots in the grade explored and covered with old wire fabric or mats and overlaid with burlap, the trucks began to roll fast and furious up to and away from the paver and gradually a ribbon of concrete began to unroll behind the paver. The Superintendent heaved a sigh of relief and said, "I ordered duck boards so as to be ready for this but they delayed getting them ready at the shop. A pretty bunch of money they have cost us, but she's rolling out now and we have it licked. So long."

The feature article of our May issue will describe experiments in soil-cement base stabilization on a highway in Delaware.

New A.I.S.C. District Engr.

Announcement has been made by the American Institute of Steel Construction of the appointment of Walter T. Norris of Oakland, Calif., as District Engineer for the Pacific Coast, with headquarters at San Francisco. Mr. Norris has been an Engineer for the Moore Dry Dock Co. of Oakland.

Other district offices are located at Worcester, Mass.; New Orleans, La.; Atlanta, Ga.; St. Louis, Mo.; Philadelphia, Penna.; Cleveland, Ohio; Chicago, Ill.; and Topeka, Kans.

C. & E. M. Photo
Lambert & George used a Galion retread mixer hauled by an International TD-18 to mix stone and asphalt on a 6.576-mile road-mix job east of Hardwick, Vt.

Gravel for Road Mix From Portable Plant

(*Continued from page* 21)

the 5-ton tandems.

Following this, the only activity was the completion of the shoulders with gravel from a pit separate from the one furnishing the subgrade material. This material, as well as the subgrade gravel, was loaded by a Lorain 75 to the contractor's fifteen Ford trucks with 3-yard bodies.

The Gravel Plant

The contractor leased a sand pit containing suitable gravel and installed a new Diamond Iron Works portable gravel crushing and screening plant powered with a Caterpillar D8800 diesel engine. This No. 36 Diamond plant has a 10 x 20 jaw crusher followed by a roll crusher with 20-inch rolls. The gravel was excavated in the pit with a Lorain 75 loading to two shuttle trucks which dumped over a rail grizzly with 7-inch openings. The oversized cobbles went overboard into a large pit, below the plant, and the sand was removed on the side conveyor, delivered to a bin and then hauled by truck to a large stockpile and used later to chink the gravel sub-base course surface after it had been partly rolled. As 50 per cent of the material as delivered to the grizzly hopper was rejected as sand or large cobbles, the plant was worked to capacity, furnishing the required amount of specification gravel sub-base course material. The contractor was fortunate in being able to sell a considerable quantity of sand which contained a desirable amount of binder to town and state highway departments for use in maintaining local highways.

The suitable crushed gravel was delivered directly to a stockpile by a long belt conveyor and leveled off, to prevent segregation, by an RD7 Caterpillar tractor and LeTourneau bulldozer. A 10-B Bucyrus-Erie ⅜-yard shovel loaded the trucks from this stockpile.

Personnel

On this Federal-Aid Project 81-A, B, F, I and J, between Hardwick and Walden on Vermont Route 15, Lambert & George of Montpelier, Vt., was the contractor. Both principals, M. George and Jim Lambert, acted as joint superintendents in the operation of the job. For the Vermont Highway Department, N. H. Colby was Resident Engineer. Tar for priming the base on this and adjacent contracts was furnished by the Barrett Co., and the asphalt was furnished by the Atlantic Refining Co., and applied by the Midland Asphalt Co. of Buffalo, N. Y., using Littleford distributors.

Hydraulic Hand Jacks Of 1 to 75-Ton Capacity

Catalog Section No. J-41, published by the Blackhawk Mfg. Co., Milwaukee, Wis., is devoted to twenty models of Blackhawk hydraulic hand jacks, from 1 to 75-ton capacity. According to the manufacturer, one man using a short handle can easily operate any of the models. Full power is developed vertical to horizontal, for pushing, spreading, lifting and pressing jobs. Pump-on-side design permits convenient operation at horizontal position because the handle always extends outward to the operator and not toward the floor.

Copies of this catalog section describing the construction features of these jacks and depicting their wide range of applications may be obtained direct from the manufacturer.

1941 Condensed Catalog On Construction Equipment

Caterpillar Tractor Co., Peoria, Ill., has just issued a 36-page 2-color catalog on the more than 50 products which are made by this company. Sections of the booklet are devoted to Caterpillar track-type tractors, road machinery, diesel and natural-gas engines, diesel marine engines, diesel automotive engines, and diesel and natural-gas electric sets. Each of the products is illustrated and brief specifications are given.

Copies of this catalog may be obtained without charge by writing direct to the manufacturer and requesting Form 6425.

New Rawlplug Field Engr.

Announcement has just been made that Vincent J. Riordan has joined the Rawlplug Irvington Co., Irvington, N. J., as Field Engineer, covering the complete line of anchoring devices made by the Rawlplug Co., Inc., New York City.

Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York, *today*)

From_____
(*Old address*)

_____

_____

To_____
(*New Address*)

_____

_____

Name_____

Building Levees With Hired Labor

U. S. E. D. at Ironton, Ohio Completes 20,000 Feet of Levee to Loop City and Protect It from Floods

(*Photo on page 52*)

✦ WITH hauls as great as 3 miles one way through the city streets from the borrow pit to the levee, the U. S. Engineer Department is completing its program of flood protection for Ironton, Ohio, started in 1938, (C. & E. M., Feb., 1940, pg. 22). All of the earth levee construction, on the south side of Ironton, was done with local relief labor and a maximum use of heavy construction equipment for loading, hauling and compacting the embankment. To protect the heavy traffic through the city, where the 8 and 10-yard Euclids had to use the same streets, accidents were prevented by five flagmen at turns and caution signs in the middle of every cross street close to the intersection.

The Borrow Pits

The borrow pits, as well as the right-of-way for the levee itself, were furnished by the City of Ironton as part of its contribution to the flood-protection project. The major borrow pit was 24 acres in area and was worked from two sides of a central roadway which was finally excavated by the dragline. A bridge which was built to carry the heavy hauling units over a small stream was then removed, and a secondary borrow area on the other side of the stream used to complete the work.

The 8 and 10-yard Euclids were loaded with a P & H 2-yard dragline and a Manitowoc 1½-yard dragline equipped with drag buckets. These two machines normally loaded 4,500 yards of material in the 16 hours comprising the two shifts.

Hauling

The maximum haul for the fleet of eleven Euclids was 6 miles round trip with the minimum of 3¼ miles, much of it through city streets. For one section of levee, between 1½ and 2 hours of the 16 were lost by delays at grade crossings at the Norfolk & Western Railroad which hauls bituminous coal in minimum train loads of 100 cars and frequently over 150. The big hauling units maintained speeds of around 20 miles per hour in practically all of their hauling, and dumped at speeds around 10 miles per hour on the levees.

Spreading and Compacting

It was the aim throughout the work to have the heavy loaded rubber-tired Euclids drive on to the embankment at one end, breaking track, and then off at the other end as they dumped. This aided greatly in compacting the fill which was spread in 6 to 12-inch layers by an Allis-Chalmers Model L tractor with a Baker bulldozer, a Caterpillar RD7 with a LaPlant-Choate bulldozer and pulling a Parsons disk roller, and another Caterpillar Forty diesel tractor with a LaPlant-Choate bulldozer. Two disk rollers were used on this job, one a 5-ton and the other an 8-ton Parsons unit.

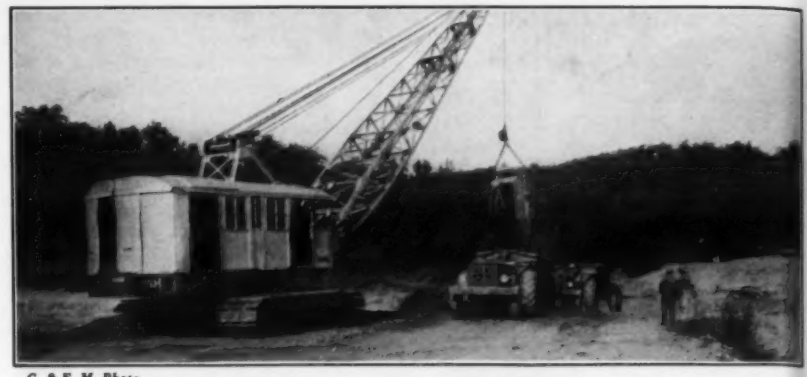
Where material was being placed against the abutments of the gates, the material was hand-shoveled against the wall, keeping it slightly above the fill and then was pneumatic-tamped for 2 feet from the wall.

Dressing and Seeding

The levee was dressed by using the Forty tractor and bulldozer starting at the top and keeping the blade at the right elevation so that the slope would be trimmed to exactly 2½ to 1 on the land side and 3 to 1 on the water side. The final dressing and preparation of the slopes and crown was done by hand by a crew of 10 men and then the entire area was seeded with 30 pounds of grass seed per acre. During humid weather the grass seed took root rapidly, quickly covering the slopes and top. These levees are not maintained by the U. S. Engineer Department but, when completed, are turned over to the City to maintain.

Personnel

The work of levee building was carried on in two 8-hour shifts from Monday through Friday and 4 hours on Saturday, making a 44-hour week for all employees when the full equipment of eleven Euclids and the two excavators were used. When the work was approaching completion and only small gaps were being closed, one excavator and six Euclids were worked one shift a day. This work was all done under the direction of the U. S. Engineer Department District Office at Cincinnati, Ohio, Major Fred T. Bass, District Engineer, with J. K. Smith as Resident Engineer at Ironton, Ohio.



C. & E. M. Photo
Loading out from the central roadway through the 24-acre borrow pit, using a P & H dragline with a Page bucket and 8 and 10-yard Euclids.

Always remember grease is cheaper than repairs!

The first cut for a foundation trench made with a B-K No. 665 clamshell.

Contractors' Bucket Digs a Neat Trench

George J. Igel Co., Inc., contractor, of Columbus, Ohio, recently did a very neat job on a small residential foundation with one of the new Blaw-Knox two-line lever-arm type hard-digging contractors' buckets. The bucket used on the job is a No. 665, of ½-yard capacity, equipped with bottom teeth, side cutter teeth and corner cutter teeth. The shape and size of the corner and side cutter teeth are based on considerable experimentation in the field and are largely responsible for the straight trim in the trench shown in the illustration above.

Scoop counterweights are another feature of this bucket. Counterweight plates are riveted to the back scoop plates, adding strength and rigidity, increasing the life of the business end of the bucket, and reinforcing that part of the scoop directly above the cutting lip so that the tendency for the lip to bend in or bow out is minimized. The added weight directly over the cutting edge results in additional penetrating force, aiding the bucket to pick up a better load.

On the Igel job the foundation line was staked out and the outside line marked with a hand pick. The bucket then dug a trench its own width to grade all around the outside line, as shown in the photograph. The dirt on the inside of the trench was removed quickly as the foundation bottom grade and the alignment of the side walls had already been established.

All-Steel Forms For Concrete Pipe

The production of reinforced-concrete pipe for highway drainage is one of the many phases of work in state and county highway departments, and many contractors are called upon to produce concrete pipe for drainage, sewers, or similar purposes.

The manufacture of reinforced-concrete pipe has become virtually standardized insofar as wall thicknesses, reinforcing and proportioning of aggregates are concerned. Crescent heavy-duty all-steel forms for concrete pipe, made by Flint & Walling Mfg. Co., Inc., Kendallville, Ind., are precision-made, easily handled and operated so that no previous experience is necessary and any unskilled laborer, with a few simple and easily understood instructions, can produce pipe, according to the manufacturer.

An important feature of Crescent forms is that they are not cumbersome. Maximum strength and ruggedness are built into the forms by utilizing steel angles and bars, assuring a combination of lightness and durability. Crescent outer casings and cores are constructed of prime blue-annealed steel and substantially reinforced with angle and bar steel, electric welded and riveted. The core is expanded and contracted by a simple pressing down of a lever; it locks positively into position; and is self contained. All forms are equipped with high-grade malleable locks and fittings, which are easily tightened or released. In addition to the standard Crescent forms, special fabricated forms to meet any unusual requirements are also available.

Further information on Crescent all-steel concrete-pipe forms may be secured by interested state and county highway engineers and contractors direct from the manufacturer by mentioning this item.

New Heavy-Duty Trucks

The addition of five heavy-duty truck models, rounding out Reo's 1941 truck line, was announced recently by Reo Motors, Inc., Lansing, Mich. According to the manufacturer, these new models are designed for really tough jobs in their respective capacity classes. Besides increased power, they incorporate heavy-duty units throughout, including over or under-drive transmissions, heavy-duty clutch and sturdy tubular drive shaft. Rear axles in the spiral-bevel, double-reduction, or two-speed double-reduction types are available.

Other features include the Reo Moreload design to provide more load space on shorter wheelbases, shorter turning radius, proper weight distribution, complete interchangeability of mechanical units, and modern styling. The engines are all of the 7-bearing type with full pressure lubrication to all main, connecting-rod, and camshaft bearings.

Model 21H with a 288-cubic inch engine has a gross rated capacity of 17,000 pounds; Model 22H has a 310-cubic inch engine and a gross rating of 19,500 pounds; Model 23H, with a 381-cubic inch engine, is rated at 22,000 pounds; Model 23HH has a 404-cubic inch engine and a rating of 26,000 pounds; and Model 23HHH has a 517-cubic inch engine and is rated at 35,000 pounds.

Ohio Relocation Job Includes Rock Work

(*Continued from page 37*)

for all the drilling and were reground when they became dull. This work was not done on the job but the bits were shipped out. Some of the soft stone seemed to be the worst in wearing down the drills so that only 8 to 12 feet of hole could be drilled per bit.

One and ¾ and 1¼-inch Austin 40 per cent L. F. Extra dynamite with Atlas electric caps was used for blasting, fired with a du Pont hand battery. This procedure seemed to break up the rock very satisfactorily so that blockholing was confined to breaking down boulders.

Loading and Hauling

Rock was hauled both ways from the long side-hill cut to make the specified 3-foot lifts of rock in fills which were built up with 2 to 1 slopes on both rock and earth fill. The maximum hauls were about 1¼ miles with the average being slightly less than ½ mile from each end of the long cut.

In rock, the loading was done throughout with a Lorain 77 shovel loading to two 14-yard Athey side-dump wagons in tandem, pulled by Caterpillar D8 tractors, or in close places the tractors worked with only one of the crawler wagons. In addition to the four crawler wagons used, two Koehring 10-yard Wheelers and two 10-yard Autocar diesel trucks were used to take the material the longer distances. On the very long hauls, up to a dozen trucks were hired locally but these were all small 1½ to 3-ton units. The contractor did a great deal of planning to be sure that the loading roadway would be wide enough so that there would be no time lost in shifting the crawler wagons and trucks so that the empties could replace the loaded units at the shovel promptly. A Euclid bulldozer on a Caterpillar RD6 operated most of the time on the hauling road to keep it and the shovel pit in traffic-bearing condition. The Lorain 77 handled from 800 to 1,000 cubic yards of rock and earth in each of the three 7½-hour shifts, or a total of between 2,000 and 3,000 cubic yards in 24 hours.

Bids on excavation in Ohio are entered as unclassified and the hauls are as specified on the plans with no free haul and no station-yards of overhaul paid for by the state. The complete soils survey, which is available to the contractor on bidding, has greatly simplified the accounting on the job and eliminated the numerous arguments on classification of materials by bidding excavation as unclassified.

Building Fill

Material to be placed in fills is classified as random, shale, earth and rock. The classification is chiefly determined by the manner in which the material may be placed and the thickness of the layer. Random material is a mixture of rock and earth and must be placed in 8-inch layers; hence it rules out all material larger than this size. Shale breaks down very rapidly under rolling so that it is classified as earth when it is placed in fills. Earth is placed in 8-inch layers, spread and rolled, and rock may be placed in layers up to 3 feet thick but the top 3 feet of all fills must be of material other than rock. The maximum rock allowed in any fill must not be more than 3 feet thick and 1½ times the minimum diameter for the maximum length. There are a few sections on this job where special rock fill was permitted, using derrick-size rock where it was found inadvisable because of right-of-way problems to use the standard 2 to 1 slope.

Proctor tests are made on all earth fill to determine the compaction. All earth fills on this contract were compacted with a double sheepsfoot roller pulled by a Caterpillar D4 after spreading with a Euclid bulldozer on a Caterpillar RD8 tractor.

C. & E. M. Photo

In the long side-hill rock cut, a Lorain 77 loads blasted rock into an Athey 14-yard crawler wagon hauled by a D8 tractor.

The contract as bid showed an item for water in thousands of gallons. This water was primarily for wetting the earth fills to maintain the best moisture content to insure maximum density on compaction by the sheepsfoot rollers. Some of the water was used for sprinkling the hauling roads. The contractor maintained two stationary storage tanks of 800 and 1,000-gallon capacity to fill a 1,000-gallon sprinkler truck with the perforated pipe at the rear for spreading the water as uniformly as possible.

Major Quantities

The major quantities for grading structures and the paving not described in this article included:

ROADWAY

Item	Quantity	Unit	Price
Roadway excavation (unclassified)	397,881	cu. yd.	$ 0.65
Special rock embankment	2,228	cu. yd.	1.50
Water (estimated)	1,778,000	M gal.	3.00
12" corrugated metal pipe for driveways	138	lin. ft.	1.15
15" corrugated metal pipe for driveways	564	lin. ft.	1.35
18" corrugated metal pipe for driveways	128	lin. ft.	1.55
8" vitrified sewer pipe for roadway drainage with full depth porous backfill	1,278	lin. ft.	1.05
Stone paved gutter	1,577	lin. ft.	2.00
Heavy-strength flexible steel plate tension-type guard rail	12,775	lin. ft.	1.00
Calcium chloride Section M-10.3	18	tons	35.00

PAVEMENT

New aggregate delivered	8,488	tons	2.00
Soil binder delivered	1,229	tons	.50
Drying, pulverizing, scarifying, mixing, shaping and compacting	40,694	sq. yd.	.10
Water (delivered and applied)	38,868	gal.	.015
Bituminous prime coat RT-2	10,176	gal.	.13
Surface-treatment bituminous material RT-6	21,165	gal.	.13
Aggregate for surface treatment	712	tons	2.25
Bituminous material for surface treatment (seal coat)	8,140	gal.	.13
Aggregate for surface treatment and seal coat	157	tons	2.25

STRUCTURES

Excavation for structures (unclassified)	2,181	cu. yd.	$ 1.50
Channel excavation (unclassified)	965	cu. yd.	.70
Concrete (Class C)	640.7	cu. yd.	20.00
Type A waterproofing	53	sq. yd.	.75
Type B waterproofing (36" wide)	204	sq. yd.	1.50
Reinforcing steel	90,710	lb.	.05
18" paved bituminous-coated corrugated-metal culvert pipe	1,134	lin. ft.	4.40
24" paved bituminous-coated corrugated-metal culvert pipe	606	lin. ft.	6.60
30" paved bituminous-coated corrugated-metal culvert pipe	306	lin. ft.	8.30
36" paved bituminous-coated corrugated-metal culvert pipe	90	lin. ft.	6.30
36" No. 12 gage paved bituminous-coated corrugated-metal culvert pipe	144	lin. ft.	6.30
8" minimum riprap	121.8	sq. yd.	3.50

This contract was operated 24 hours a day with three 7½-hour shifts, allowing ½ hour for greasing the equipment on each shift. For the night shifts the contractor provided excellent light by stringing a power line on the trees at the top of the cut and spotting 200-watt lights at intervals of about 30 feet with large enamel-lined reflectors behind them to direct the light where it was most needed. Current was furnished by a 120-volt power line from the local utility.

Drainage Structures

There were only two concrete drainage structures on the job, one a 10 x 8 concrete box culvert 174 feet 6 inches long at the north end of the long cut and which will carry 35 feet of fill, and just north of this a 9 x 7 box culvert 118 feet 8 inches long. The remainder of the drainage consisted of corrugated bituminous-coated pipe and paved invert pipe from 15 to 36 inches in diameter, all used for cross road culverts. All of the concrete was transit-mixed and delivered from Huntington, W. Va., a 17-mile haul one way. The construction of the drainage structures was subcontracted to John Hill of Mansfield, Ohio.

Personnel

The contractor for this Federal-Aid Project involving 3.499 miles of grading and a 22-foot bituminous surface was awarded to A. J. Baltes of Norwalk, Ohio, on his low bid of $351,855.40. John W. Baltes was Superintendent for the contractor throughout the work. Ralph Hill, Resident Engineer for the Ohio Department of Highways in Lawrence County, had general charge of this work, with Hal Goodman as Project Engineer, and D. H. Stewart as Concrete Control Inspector on the structures.

Highway Development Conference in Ohio

State and county highway engineers, landscape engineers, students, and many out-of-state engineers attended and addressed the first Short Course on Highway Development held at Ohio State University, Columbus, Ohio, February 28 and March 1, 1941. Taking advantage of the presence of members of the District Conference on Roadside Development, the group speaking on various phases of the important subject of roadside development was augmented by engineers from other states and the Public Roads Administration. The attendance at the various sessions ran from 175 to 250.

The first session was devoted to a presentation of the new program of the Public Roads Administration by Wilbur H. Simonson, Senior Landscape Architect, PRA, and an excellent picture of the Ohio roadside development program by Dallas D. Dupre, Jr., Landscape Architect, Ohio Department of Highways. The session was closed with a paper on defense highways presented by T. W. Kinnear, Chief Engineer of Construction.

Following luncheon at the Faculty Club, the afternoon session discussed the highway system from the standpoint of the engineer, the erosion-control engineer, and the landscape architect, the three points of view being presented by W. V. Buck, PRA District Engineer for Ohio, C. F. Izzard, Federal Engineer in charge of erosion control for District 10, and H. J. Schnitzius, Landscape Engineer, Indiana State Highway Department. Dinner was served at the Faculty Club, after which the evening session, with the maximum attendance, was addressed by Alfred Bettman on the subject "Zoning of Roadsides."

The Saturday morning session was devoted to the subject of the selection of planting material, with papers by George B. Gordon, PRA Associate Landscape Architect, on "The Ecological Approach to Roadside Planting"; by Prof. Lewis C. Chadwick, Department of Horticulture, Ohio State University, on "What Plant Material Is Available as Nursery Stock?"; and Stanley Speed of Columbus, Ohio, on "What Makes a Desirable Tree for Highway Planting?" The session was closed with a series of interesting and instructive colored photographs of roadside parks in Michigan shown and discussed by Philip Troeger, Landscape Architect, Michigan State Highway Department.

The Short Course was sponsored by the Department of Landscape Architecture, Ohio State University, with Prof. Charles R. Sutton in charge, assisted by Dallas D. Dupre, Jr., for the Ohio Department of Highways.

Care With Blasting Caps Will Prevent Accidents

Warnings are being broadcast by the Institute of Makers of Explosives asking all users of blasting caps to make sure that they do not fall into the hands of children. This campaign to prevent accidents of this type has been carried on continuously since 1926 by the Institute and last year the number of children injured was reduced to 157 as compared with 195 in 1939.

Statistics show that children finding caps which have been carelessly thrown away or left lying about explode them by picking them with nails or pins, hammering them, or throwing them into fires. It will be a public service if all users of explosives will make certain that blasting caps can not fall into the hands of children.

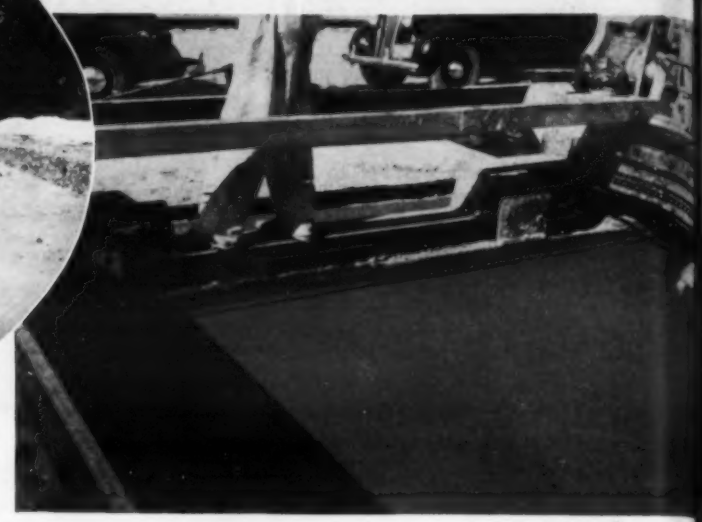
Index to Advertising

Contractors and Engineers Monthly

C. J. Langenfelder & Son, who was awarded three of the six concrete paving contracts for the relocation of U.S. 40 in Maryland, used a Rex 34-E dual-drum paver and a Jaeger concrete spreader on his jobs. Below is a scene on his contract Ce-214. See page 15.

Spreading the top course of concrete on C. J. Langenfelder & Son's 1.854-mile grading, drainage and paving contract on U. S.-Md. 40.

All of the contractors on the six concrete paving contracts for the location of a 19.68-mile section of U.S. 40 between Baltimore, Md., the Delaware state line used Koehring longitudinal finishers. Below the unit owned by the M. J. Grove Lime Co. on its 1.818-mile cont



C. & E. M. Photo

Finishing levee at the south end of Ironton, Ohio. The big Euclids broke track over the embankment, furnishing compaction for the material spread with bulldozers. See page 43.

C. & E. M. Photo

Lambert & George's new Diamond portable gravel crushing and screening plant furni gravel for its 6.576-mile road-mix job east of Hardwick, Vermont. See page 21.

G. H. Spears, Superintendent for the Grace Construction & Supply Co., Fort Wayne, Ind., and winner of the Central Section Award in CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for 1940, was formally presented with the plaque by James D. Adams, Chairman of the Indiana State Highway Commission. See page 23. Left to right, William M. Holland, Secretary, Indiana Highway Constructors, Inc.; James D. Adams; G. H. Spears; and Henry L. Jacobs, Secretary-Treasurer, Grace Construction & Supply Co.

Construction Digest Photo

C. & E. M. P

Feeding the cold elevator by means of a tra and bulldozer at the Asphalt Paving Service's p able asphalt plant set up in a state-owned sand near Providence Forge, Va., where it produ 24,000 tons of hot-mix retread for its contracts the vicinity. See page 11.

Pouring and hand-finishing concrete slab for the clear-water basin on the $6,000,000 contract for the substructure of the new $20,000,000 South District filtration plant in Chicago. This contract, which was awarded to Michael Pontarelli & Sons of Chicago, involved the placing of 210,000 cubic yards of concrete in 5,200,000 square feet of forms. See page 2.

C. & E. M. Photos

Blasting out the high road along the Ohio River on Route 7, where A. J. Baltes moved 350,000 cubic yards of rock and built long fills at the ends of a 10,000-foot side-hill cut on his 3.499-mile grading and paving contract for the relocation of a part of route, necessitated by highway settlement because of poor foundation. In the circle, a w drill prepares for the big blast on the shelf above the river. See page 37.